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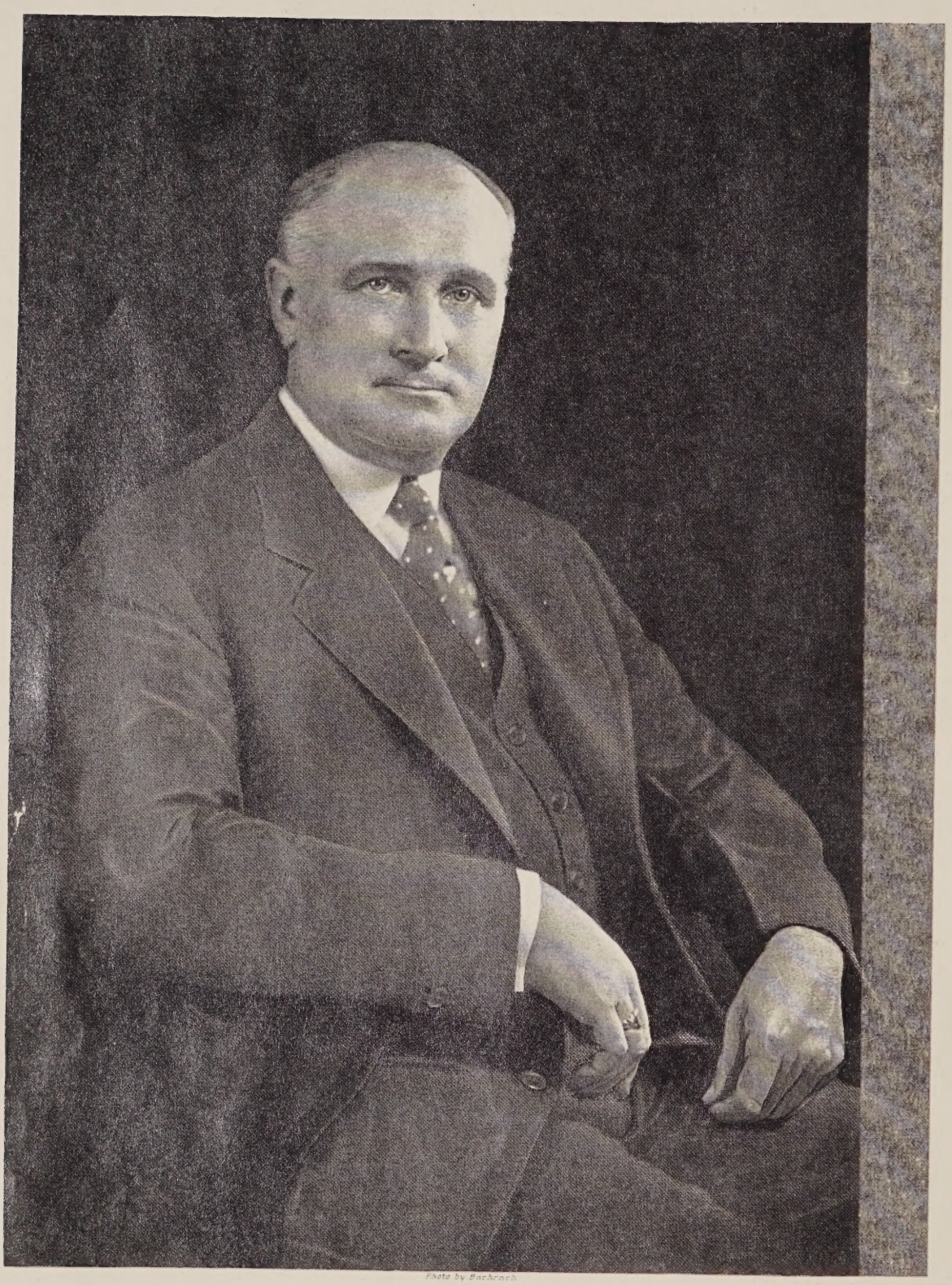


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Orra L. Stone

HISTORY

of

Massachusetts Industries

Their Inception, Growth and Success

By

ORRA L. STONE

VOLUME I

ILLUSTRATED

BOSTON-CHICAGO
THE S. J. CLARKE PUBLISHING CO.
1930

REF
HC107
.M457
Soc Sci
6/18/2003

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FOREWORD

ON this the eve of the world-embracing observance of the three hundredth anniversary of the founding of the Massachusetts Bay Colony it has seemed to many manufacturers that it is timely to review the early industrial development of the Commonwealth of Massachusetts and to reap the benefits of later research.

These three centuries have witnessed a growth along productive lines in the Bay State more remarkable in its influences than that attained in any other land from their beginnings, which run back many hundreds of years.

I have been unable to find in the archives of a library or historical society in Massachusetts any comprehensive volume indicating that the earnest participants of earlier and later times have taken the pains to collect and collate in a state-wide way the industrial happenings in this state between 1620 and the present, or to analyze their sequence as well as their far-reaching consequences, and thus picture to the world how important and influential has been the contribution made by Massachusetts inventors and manufacturers to the growth not only of the State, but of the Nation as well.

Great changes have been wrought in these three hundred years, and while the remote and revered past is being recalled as never before and with steadfast purpose and reward, we must remember we are living in the present, and in the very midst of much of credit, performance and progress which should be added to the chronicles of previous endeavor, and thus preserved for those who are to appear upon the scene in later years.

For more than a decade I have been hoping that the time would come when I could undertake the task of writing a history of the industries of Massachusetts, in order that it might be emphasized that the seed sown in 1620 by the Pilgrim Fathers, and nurtured by the rearing of the Massachusetts Bay Colony ten years afterward, had not fallen on barren ground, but rather had reached its fullest fruition in the first half of the twentieth century.

Such an opportunity presented itself to me when the S. J. Clarke Publishing Company, with offices in Boston, Chicago and San Francisco, a long-established and reputable corporation, engaged in the historical field, offered to publish such manuscript as I might prepare dealing with the inception, growth and success of Massachusetts manufactures, and to spare no expense in carrying out the mechanical, illustrative, binding and other features of such a work. So far as my knowledge goes there is not in existence within the geographical limits of the six New England States any other going organization so completely equipped to present a work of this nature as the Clarke Company. It has had a wide experience in the preparation and issuance of historical volumes and its activities have not been confined to the New England field, but have been far-flung throughout the nation.

Having accumulated over a period of years a considerable mass of historical matter, in more or less incomplete form, it has been my earnest

endeavor, during the past two years, to supplement this data by gathering from many sources pertinent facts pertaining to the origin, rise, growth and standing of all the major manufacturing enterprises that have come into being in Massachusetts between 1620 and the present.

I recognize my deficiencies and I wish so ambitious a work might have been entrusted to abler hands, but my associations have been such during the past ten years or more that I have had the good fortune of being able to view the industrial development of this Commonwealth in a somewhat comprehensive way, and it has been an interesting experience to me to attempt to present an adequate word picture of the part Massachusetts has played in the field of manufacturing since the pioneer enterprises were born on this fringe of the Atlantic seaboard three centuries ago.

The story of what has been done and is being done in Massachusetts along manufacturing lines has been my inspiration to portray the record, and I here acknowledge the coöperation that has been given me by countless men and women in the work of recording the results attained in American history by the inventors and industrial entrepreneurs of our beloved Commonwealth.

Orra L. Stone

Boston, Jan. 2, 1930.

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CHAPTER I

EARLY ATTEMPTS TO ESTABLISH MANUFACTURES IN THE COLONIES OF MASSACHUSETTS

Necessity, the great mother of invention, was not the only important factor in the early development of manufacture in the Massachusetts colonies. Appreciation of the dignity of labor, plus the thrift so characteristic of the first settlers on the shores of Massachusetts Bay, conspired to make them independent of the products of the mother country at a much earlier period than their predecessors, who settled in Virginia before the New England colonies were born.

That supremacy in the industrial field, born in 1620, and continued to this date, is accounted for by the difference in temperament between the immigrants who landed on the "stern and rockbound coast" of New England, and those who founded the Virginia Colony.

To the latter, manufacturing enterprise was not only less congenial than to the New England colonists, but commercial and industrial pursuits were commonly regarded by the Virginian planters as less respectable than agricultural, and they were perfectly content to permit their shipping trade, the exportation of their tobacco and the importation of their supplies to be carried on by the more commercially-minded New Englanders.

The climate and the fertility of the Virginian soil, the abundance and cheapness of the land which enabled the Southern colonists to acquire manorial estates, concurred with their inclinations in fostering this sentiment, and to this day manufactures have not become so general in Virginia as in many states of the Union whose settlements are of fairly recent origin.

THE SITUATION AS COMPARED WITH VIRGINIA

For upwards of a hundred years efforts to introduce the manufacturing arts into Virginia, the oldest of the American colonies, constitute merely a record of unsuccessful enterprise, and this despite the fact that the region was abundantly supplied with raw materials, such as iron, flax, hemp, silk, wool, leather, and the like, which, in all other instances in America, early incited those who settled in their midst to profit from their accessibility.

So great was the dependence of the Virginians for their clothing and other supplies that Beverley, who wrote in 1705, reproachfully lamented the sad defection of his countrymen from the habits of industry, as well as the neglect of the legislative assemblies to give that encouragement so noticeable in the law-making bodies of the sister colonies.

Referring to the Virginia settlers he said: "They have their clothing of all sorts from England, as linen, woolen and silk, hats and leather. Yet flax and hemp grow nowhere in the world better than here. Their sheep yield good increase and bear good fleeces; but they shear them only to cool them. The mulberry tree, whose leaf is the proper food of the silk worm, grows there like a weed, and silkworms have been observed

to thrive extremely and without any hazard. The very furs that their hats are made of perhaps go first from thence; and most of their hides lie and rot or are made use of only for covering dry goods in a leaky house. Indeed, some few hides with much ado are tanned and made into servants' shoes, but at so careless a rate that the planters don't care to buy them if they can get others; and sometimes perhaps a better manager than ordinary will vouchsafe to make a pair of breeches of a deer skin. Nay they are such abominable ill husbands, that though their country be overrun with wood yet they have all their woodenware from England; their cabinets, chairs, tables, stools, chests, boxes, cart wheels and all other things, even so much as their bowls and birchen brooms, to the eternal reproach of their laziness." Beverley assigned as one of the reasons for this state of affairs in Virginia the lack of concentration of the colonists in towns, a condition in strong contrast to the situation in the Massachusetts colonies.

THE INFLUENCE OF THE POLICY OF CENTRALIZATION

In early colonial days what is now the Bay State was a land of towns. For many years all the homes were built within two miles of the meeting-house, in order that there might be a centralization of forces to resist the seemingly endless Indian attacks.

This fact alone may be said to have been largely accountable for the rapid growth of our industrial centers when the danger from the redmen passed. In earlier times Massachusetts fed itself, yet today all but about 25 per cent of our food products are brought into the state from other parts of the country, while 92 per cent of the people in the commonwealth reside in her cities and large towns, thus reflecting the earlier influences of the policy of concentration of population.

The story of the Plymouth settlers and those who soon followed them shows that despite a sterile soil and a rugged climate, they early applied themselves to manufacturing and commercial enterprises and so successfully, that, at the present day, there is no useful art of ancient, medieval or modern times, that has not been fostered by their descendants and no part of the globe so remote or inaccessible that is not indebted to their progeny for the necessities and the luxuries of civilization. Their energy accounts for the fact that during the United States Government's fiscal year of 1928 residents of Massachusetts paid income taxes to the Federal treasury amounting to $98,537,347.27, while the citizens of Virginia paid similar taxes the same year amounting to $21,860,734.88. Indeed, if there are added together the total Federal income payments of Alabama, Florida, Georgia, Louisiana, North Carolina, South Carolina and Virginia, during the fiscal year of 1928, they do not equal the Massachusetts figure by $1,458,314.03.

CAPITALIZING THE LUMBER RESOURCES

Next to the cultivation of the soil, the abundant forests naturally attracted the attention of the early colonists to the harvesting of lumber. For the products of the woods in every conceivable shape and form there existed a constant demand in England, where the timber had been so wasted for the supply of her iron-works, that as early as 1581 it had been found necessary to restrain its use.

The islands of the West Indies were keen to exchange their staple products for pipe, staves, hoops, and lumber, and when, on the tenth of September, 1623, the ship *Anne,* of one hundred and forty tons, was

freighted at Plymouth, with a cargo of clapboards, and a few beaver skins and other furs, the first products of the industry of the Plymouth Colony entered the marts of trade, and the first export activity of America was inaugurated.

Chief among the manufactures fabricated from the almost inexhaustible wealth of the American forests, and in which Massachusetts in the three centuries since the settlement of 1620 attained preeminence was the building of ships, which began at Plymouth in 1624, within four years after the landing of the Pilgrims. That year, the colony received an accession of a carpenter and a salt-maker, sent out by the company. Of the former, Governor Bradford wrote: "He quickly builds two very good and strong shallops, with a great and strong lighter, and had hewn timber for Ketches (a much larger description of vessel), but this spoilt; for in the heat of the season, he falls into a fever and dies, to our great loss and sorrow." The salt-maker, for whom the lighter appears to have been built, selected a site, erected a building, and attempted to manufacture salt for the fisheries, first at Cape Ann, and later on Cape Cod, but, as history records, "through his ignorance and self-will" both ventures proved unsuccessful.

At Manomet, on Cape Cod, a pinnace was built by the Plymouth settlers in 1627, to engage in fishing operations, but some twenty-one years elapsed before a vessel of any size was constructed. She was barque-rigged, of about 50 tons burden, was estimated to cost two hundred pounds, and was owned by thirteen proprietors residing in the Plymouth Colony. It has been well stated that the building of this vessel, small though she was, "was an undertaking at that period of exigency and privation, surpassing the equipment of a Canton or Northwest Ship with our means at the present day."[1]

THE SHIP-BUILDING OF MASSACHUSETTS—AN EPIC IN ITSELF

The attempt to rehearse the ship-building operations that have taken place on the soil of Massachusetts during the past three hundred years would require as many volumes, if not more, as are to be employed in presenting this history of the manufactures of the Bay State, and save as space will be devoted to the rise and progress of existing ship-building corporations it is the author's preference to present, at a later date, an exhaustive history of Massachusetts ship-building, upon which subject he has been assiduously collecting and collating data for the past half-dozen years. To adequately portray the sequence of operations in this particular field it also appears that the subject should be treated by decades, rather than by geographical divisions, as has been considered desirable in presenting this summary of manufacturing operations, outside the domain of ship construction. Another factor entering into the decision is that the building of vessels and the development of our maritime commerce was almost exclusively confined to a relatively few localities, while all other types of industry have been maintained, at periods or with constancy, since the beginning, in almost every city, town, village and hamlet within the geographical limits of the commonwealth.

THE ADVENT OF THE SAWMILL IN THE COLONIES

The sawmill, as a mechanism for cutting timber, had not been in use in some countries of the world very long before the Plymouth settlement. Prior to its invention, boards and planks either were produced by hand

1.—Massachusetts Historical Collections, I, 278.

operations, or split and hewn with the axe, thereby adding to the cost of the products.

During the first years of the American colonies the latter mode generally prevailed and the most authentic records indicate that not until about the year 1633, or approximately thirteen years after the landing of the Pilgrims, was the first sawmill built in Massachusetts, and even at that time the mechanism was not employed in England until some years after. Where the initial installation was made is lost in oblivion, but it is known that the Courts of Assistants in London made provision for the introduction of both grist- and sawmills, by the first immigrants to the Colony of Massachusetts Bay. In 1628-29 men skilful in making pitch and salt, vine planters, etc., were sent to the colony, and in the Company's second letter of instructions to Governor Endicott directions were given him "To give approbation and furtherance to Francis Webb, in setting up his sawmill," which was to be sent over in the *Lyon's Whelpe,* with other stores from Dorset and Somerset, England.[2]

Whether Webb's proposal to erect a sawmill on the soil of the Massachusetts Bay Colony was actually carried into effect cannot be asserted.

The patent system, whereby exclusive personal use of new inventions is provided, had its rise in England early in the seventeenth century, and in the system of laws termed the "Body of Liberties," adopted by the General Court of Massachusetts, in 1641, is found the first evidence of this great stimulus to industrial development. The law declared that there "should be no monopolies but of such new inventions as were profitable to the country, and that for a short time only." Here is found the germ of our present Federal patent laws.

One of the first applicants for exclusive privileges under this initial code was Joseph Jenckes, of Lynn, who arrived in the province in 1645, and who, the following year, petitioned for a patent covering a new application of water-power to mills for various uses, including a sawmill.

On May 6, 1646, the General Court resolved that, "In answer to the peticon of Joseph Jenckes, for liberty to make experience of his abilityes and Inventions for ye making of Engines for mills to goe with water for ye more speedy dispatch of worke than formerly, and mills for ye making of Sithes and other Edged tooles, with a new Invented Sawe-Mill, that things may be afforded cheaper then formerly, and that for fowerteen yeeres without disturbance by any others setting up the like inventions, that so his study and cost may not be in vayne or lost; this peticon is granted so as power is still left to restrain ye exportation of such manufactures, and to moderate ye prizes thereof if occasion so requires."[3]

THE DESIRE TO ENHANCE PRODUCTION AND MANUFACTURE AT LESS COST

In this petition, granted almost 300 years ago, is found the genesis of the policy that has dominated the thought and desires of every Massachusetts inventor and manufacturer from that day to this—"that things may be afforded cheaper then formerly." This is the basis of the transformation from the hand-made article to the machine-made product and the primary object of the present-day mass production.

The ingenious patentee in this case, whose son Joseph, built the first dwelling in Pawtucket, R. I., and whose grandson of the same name

2.—Colony Records, 1,401. On page 179 of Young's "Chronicles of Massachusetts," it is stated that Webb was not a colonist, but one of the adventurers, and a member of the Mass. Bay Company, and a subscriber to the amount of fifty pounds.

3.—Records of the General Courts, Vol. II, 149; Vol. III, 275.

became governor of the Rhode Island Colony following Governor Cranston, is frequently mentioned in the later records of the General Court, as being responsible for other inventions.

His improvement in the manufacture of scythes, which was included in his initial patent, has not been materially modified to this day. Jenckes was identified with the first iron works in the Colony, set up at Lynn, but there are no records indicating that he erected sawmills.

Robert Studson, Mr. Hatherly, founder of Scituate, and Joseph Tilden built a sawmill at that place in 1656, which may have been the first in the colony.[4] Permission to construct this mill, which stood on "the third Herring Brook," and which was destroyed by the Indians in 1676, was to be withdrawn unless it was built within three months from November 10th, the date of the grant. It was further stipulated "that in case any of the townsmen do bring any timber into the mill to be sawed, the owners of the mill shall saw it, whether it be for boards or plank, before they saw any of their own timber; and they are to have the one half for sawing the other half. And in case any man of the town that doth bring any timber to the mill to be sawed shall want any boards for his particular use, the owners of the mill shall sell him boards for his own use so many as he shall need, for the country pay at 3s. 6d. an hundred inch sawn; but in case the men of the town do not supply the mill with timber to keep it at work, the owners of the mill shall have liberty to make use of any timber upon the Common to saw for their benefit."[5]

In 1664 the King's Commissioners visited New England and reported that in the Colony of Plymouth there were "about twelve small towns, one sawmill for boards, etc." Probably the sawmill alluded to was located in what is now Pembroke, then a part of Duxbury.

The records are extremely meagre with respect to the locations of all the sawmills that were erected on the almost unlimited number of rivers, streams and brooks of earlier times, nor is it possible to arrive at any fair estimate of their increase through the exportations of sawed lumber. Much of the product was taken to Salem or Boston, where it was despatched to foreign countries. The statistics are few and imperfect, and fail to denote the species of lumber turned out by the mills. It is known the products included staves, hoops, clapboards, and the like, and that some were sold in a crude state and others wrought by hand.

AS EARLY AS 1793 WORCESTER COUNTY HAD NINETY SAWMILLS

However, it is known that in 1793, there were in Worcester County not less than ninety sawmills, of which eleven were in Hubbardston, and yet that county then had few large streams and no navigable rivers. This total represented more than 50 per cent of the number of mills returned for the entire state by the marshals who carried on the first census of Massachusetts seventeen years later (1810). The statistics promulgated at that time fixed the number of sawmills at 150—a figure far below the actual total. The returns were very imperfect, embracing only the two counties of Berkshire and Hampshire.

Many of the mill streams in Worcester County were mere brooks, often dry for protracted periods during the summer and fall months, and insufficient to furnish water power the year round. A Mr. Wetherbee, who erected grist- and sawmills on the Nashua River, at Lunenburg,

4.—Mass. Historical Collections, "Description of Scituate," Second Series, Vol. I, 225.
5.—Mass. Historical Collections, "Description of Scituate," Second Series, Vol. I, 249.

was forced to dig a canal a mile in length to gain a constant supply of water, and that enterprise was regarded at the time as a step of great moment. In 1684 Capt. John Wing erected the first grist- and sawmills at what is now the northerly end of Main Street, in the City of Worcester, where the remains of the dam were visible up to sixty years ago. The early mills were generally equipped with but one saw, attended by a man and a boy. Their average capacity was about 4,000 feet per day, and they could not operate during the winter season when the water supply was frozen.

It is an interesting commentary that a Massachusetts colonist, named Sawyer, who settled at Lancaster, in Worcester County, and who was taken to Canada as a captive of the Indians, built for the French, on the Chamblee River, near Montreal, in 1706, the first sawmill ever erected in that country, as the price of redemption of himself and his son. Previous to that time Canada had no artificer capable of designing, building or operating such a mill, and the ingenuity and skill of a Massachusetts man were called upon to create this industrial device for our neighbor across the border.

About 1673, John Prescott, of Lancaster, built the first grist mill in the Middlesex town of Groton, and in 1686 his son, Jonas, erected a sawmill there, being granted permission to use Stony Brook, on condition that "he should accommodate the town with merchantable boards at six pence a hundred feet cheaper than they were sold at any other sawmill, and for town pay, and that town be supplied before any other persons, provided, always, the sawmill do not hinder the corn mill."

In the heavily forested counties of Berkshire and Hampshire sawmills were erected at early periods in North Adams, Becket, Mount Washington, Pittsfield, Greenwich, Enfield, Hadley, Ware, and other towns on Mill, Fort, Stony and other rivers. A great deal of fine lumber was formerly cut at Clarksburg, settled in 1769, while as late as 1866 the Town of Florida, settled in 1783, had fourteen sawmills, which were turning out 20,000 to 100,000 feet of lumber each per annum, and Savoy, first settled in 1777, was supporting in the '60s no less than twenty-five sawmills.

THE FIRST WIND MILL WAS SET UP IN WATERTOWN

As a motive power, water was employed much earlier than the air and most of the pioneer sawmills were driven by water.

In the Records of the Governor and Company of Massachusetts Bay, under date of March 17, 1628, old style, is found an entry stating that eleven pounds were paid for a pair of mill-stones to go to New England in a ship, but where they were installed is unknown. History records, however, that the first mill in New England was a wind mill erected in Watertown, and that it was taken down in 1632, and rebuilt in the vicinity of Boston. Bond's "History of Watertown" throws little light on the subject, the author of that work even finding it impossible to determine who built the first water-mill there, and he makes no mention of the wind mill. It is barely possible that the latter may have stood within the limits of Newton, as the terrain of the two municipalities join. In Drake's "Antiquities of Boston," it is intimated that a wind mill was located near Newton.

The Watertown or Newton mill was dismantled in August, 1632, "because it would not grind but with a westerly wind," and it was set up at the north end of Boston, on the eminence previously called Snow Hill,

afterwards Copp's Hill, and finally Wind Mill Hill, by which name it is referred to in the Colony Records, in 1635. In 1636 two additional wind mills were erected, one in Boston and the other in Charlestown, the latter being blown down in 1648.

William Gilson built a wind mill at Scituate, in 1637, and the same year land was granted John Horn for one at Salem. In 1639, Horn removed it to Wind Mill Point, on the south side of North River, where a grist mill of the same nature stood as late as 1771. Another wind mill located at Orne's Point at an early date gave way to the site of a bridge. In 1703 a wind mill was erected at Newbury. Edward Holyoke, who took the freeman's oath, in 1638, owned a wind mill, located on Purchase Street, Boston, near Fort Hill, which he later sold to Richard Woodward. In 1701, John Arnold petitioned for the right to erect a wind mill on Fort Hill, and was given permission to place it "on the Town's land," paying such "quit-rent" as the selectmen might require. In 1740 another wind mill was erected on the same hill, this one being removed from Roxbury.

THE STOUGHTON MILL ON THE NEPONSET RIVER

Nor is it easy to determine the location of the first water-mill in New England. The Massachusetts Historical Collections[6] state: "The first mill built in Dorchester, and the first in the colony, was erected by Mr. Stoughton, by leave of the Plantation on the Neponsit River, in the year 1633." The reference to the stream seems to justify the inference that the venture was a water-mill. But from a record of the Court, made in 1628, in which "Roxbury is enjoyned to repair the other way toward the Dorchester mill upon paine of £20 forfett,"[7] it would seem that a mill existed still earlier, at Dorchester.

The first mention found in the Colony Records, of Stoughton's mill is in an entry under date of April 1, 1634, to the effect that "Mr. Israel Stoughton hath liberty granted him to build a myll, a ware, and a bridge over Neponsett River, and to sell the alewives he takes there at 5s the thousand."[8]

In 1631 a canal, called Mill Creek, which originally divided the central part of Boston from the North End, was built and provided means for a tide mill. A causeway, located across the neck which separated the tidewater at Dock Square on the east from a cove, which ran up on the north side almost to Hanover Square, converted the cove into a large mill pond, which covered the area between Charlestown, Merrimac and Hanover streets. The Mill Creek, through this neck, admitted the tide to the Mill.

WHEAT BECOMES AN ARTICLE OF EXPORT

The presentation to the General Court of a specimen of rye the same year that the first water-mill was erected, was an event of great significance to the people of the Massachusetts Bay Colony, as up to that time the only grain that had been cultivated from 1620 onward was Indian corn. Before the introduction of the grist mills, it was coarsely pounded and cooked in the Indian mode, and for those who had been accustomed to a different diet overseas, the corn produced an unpalatable kind of bread. "The want of English grain, wheat, barley and rye," wrote Johnson, the historian, "proved a sore affliction to some stomachs, who could

6.—Mass. Historical Collections IX, 164.
7.—Records of the Governor and Company of Mass. Bay I, 316.
8.—Records of the Governor and Company of Mass. Bay I, 114.

not live upon Indian bread and water, yet they were compelled to it," and in referring to the first sample of rye he observed, "This poor people greatly rejoiced to see the land would bear it."

It is interesting to note what progress was made during the next decade by the settlers in widening the list of staple grains as within ten years from the date of the setting up of the first water-mill wheat had become an article of export from Massachusetts, and as Johnson said: "Portugal hath had many a mouthful of bread and fish from us."

In 1633, Edward Tomlins was granted by the settlers of Lynn, in town meeting assembled, the privilege of setting up a corn mill "at the mouth of the stream which flows from the Flax Pond," a site occupied two hundred years later by Chase's mill. This was the second corn mill, operated by water, set up in the Massachusetts Bay Colony, and it was removed into the town about ten years later, when the privilege of water and water-courses was granted anew.[9]

WATER-MILLS ERECTED IN THE PLYMOUTH COLONY

In the Plymouth Colony, the first water-mill was erected near Billington Sea, by Stephen Dean, in January, 1633, and he assured the settlers that it would have sufficient capacity to *beat* corn for the whole colony. It is thought that at the outset it was not a real grist mill, but merely a pounding mill, by which the corn was removed from the hull and prepared for samp (nausamp) and succotash, the art of which had been acquired from the Indians, as, in 1634, it was agreed that Dean should surrender his privilege just as soon as a grinding mill could be set up.[10]

In 1636, John Tenney, a brewer, who had come to the Colony thirteen years before, was granted liberty by the General Court at Plymouth, to erect "a mill for grinding and beating of corn upon the brook at Plymouth,"[11] but two years later he was "presented" according to the Town Records, for not grinding corn well and seasonably. In 1681, Charles Stockbridge, was employed to build another grist mill on the same brook, which was frequently referred to as the Upper Mill. In 1633 a Mr. Dummer built a grist mill at Roxbury, and the next year a water-mill was erected at Watertown, where a considerable proportion of the immigrants of 1630 had located. In all probability it was a joint venture on the part of Mathew Cradock and Edward How and it was certainly a going venture before August, 1635. It stood on Mill Creek, an artificial canal, at the head of tide water on the Charles River, and at what was denominated the first fall, whence the water was conducted from a stone dam across the river itself, into what is believed to be the oldest artificial mill race or canal in the United States, and which has been ever since that time in uninterrupted use. A grant of land was made for the mill in January, 1634-35, and the following August How sold one-half of the property to Thomas Mayhew for £200 on a bond and mortgage, he having also purchased the remaining half from Mr. Cradock's agent. He disposed of the entire property to Deputy Governor Thomas Dudley, for £400. The mortgage to How not having been discharged, he afterward claimed title to the mill, but in 1641, a court decision declared that the right of possession belonged to Dudley. In 1653 the mill was rated at £140 for the support of the ministry. About 1700 the title to it was held by the heirs of Hon. Thomas Danforth.

9.—Lewis "History of Lynn," 81.
10.—Thacher's "History of Plymouth," 74.
11.—Young's "Chronicles of Plymouth," 172.

THE EARLY GRIST, WIND AND TIDE MILLS OF CAPE COD

Cape Cod early began the erection of grist, saw and wind mills. In Sandwich, as early as 1655, the town appropriated £20 toward the building of a grist mill, which rendered service to the citizens up to 1881. In 1669 a second grist mill was built there.

About 1684 Shearjashaub Bourne built a grist mill, in Mashpee, which was operated until after 1820, and later he erected a sawmill, which continued to be used until after the middle of the last century. Hezekiah Coleman also built a mill on the river for grinding corn, but the date of this venture is unknown.

Prior to 1662, the first grist mill in Brewster, was erected in the west part of the town for the benefit of the settlers of Eastham, who, up to that time, were forced to journey to Plymouth to have their corn ground. Truro seems to have had no grist mill until 1711, when the town granted financial aid to Thomas Paine to erect one. Subsequently, three wind mills were built in the town,—one in the center, another at South Truro, and the third at the Highlands. It is probable another was set up in the East Harbor. In the latter part of the eighteenth century a water-mill for grinding corn was located on Pamet River, in the town, and as late as 1844 another was set up.

On December 17, 1695, Elisha Bourne was granted permission to set up a grist mill on Herring River, in Bourne, and in 1717, Benjamin Bourne was licensed to erect a sawmill in the town.

In 1697 the citizens of Yarmouth approved a request for the building of a wind mill on the "commons," and another erected at a date unknown, on the Stoney Cove stream, between Barnstable and Yarmouth, was operated up to about 1870.

William Howes, of Dennis, was appointed miller for the grist mill in the East Parish, in 1759. A wind mill was erected at North Dennis about 1754, owned by Lot Howes. A wind mill erected at a date that cannot be determined, stood in South Dennis until 1874. A wind mill built at Barnstable in 1775 was brought to East Dennis the following year and it continued to grind grists until 1869, when it was badly damaged by lightning. A wind grist mill, erected at West Dennis, in 1803, by Judah Baker was operated until just before the Civil war, when it was removed to South Yarmouth.

In 1787 Samuel and Joseph Bowerman and Richard Lake built a wind mill in Falmouth, which was operated as late as 1890. Two water-mills were set up in the town, prior to the erection of the wind mill, and a group of the early settlers at the east end of Falmouth built a water-mill, in that village, at a date that cannot be verified.

The most ancient industry in Eastham was a tide mill, erected on the river that connects Salt Pond with the harbor. Two wind mills, one in North Eastham, which was removed about 1865, and the other in the south part of the town, which served the public until the beginning of the present century, were also erected in Eastham, the latter having originally been set up in Provincetown, in 1776, and removed to its final site about 1795.

It is known that a wind mill was built in Chatham in 1796, while in 1800 the town boasted of seven.

Tide mills were set up in Orleans at a very early date, the first probably being owned by Timothy Cole. Another was located in the southwesterly part of the town, at Arey's Pond, and a third at Sparrow's

Pond. The town had five wind mills, these being in operation up to the end of the last century.

Wellfleet's wind mills disappeared during the decade of 1830 to 1840. When they were erected is problematical.

A wind mill located in the village of East Harwich, in the Town of Harwich, was known to Cape Codders of several generations as "Uncle Elnathan's Mill." Thomas Burgess set up a water-mill, at Harwichport, in 1763. The building known as "Hall's Mill," on Herring River, at North Harwich, probably was the first grist mill erected in the Town of Harwich. Another was subsequently erected and became known as the "Middle Mill."

SOME OF THE OTHER EARLY MILLS

The second corn mill erected in Watertown was located on Stony Brook, and in 1679-80 was exempted from "rates" for a period of twenty years. The mill was later sold for £240 and for many years was known as the Bigelow Mills. In 1690, Thomas Rider was the proprietor of a corn mill on Beaver Brook, near the site later occupied by Kendall's Mills, where several fulling mills had also stood. In after years other corn mills were also built on Stony and Beaver brooks, and other streams in Waltham and Weston, within the original limits of Watertown.[12]

In 1636 the first water-mill in Newbury was built by Messrs. Dummer and Spencer, on the Parker River, in accordance with a grant made by the General Court, and an agreement with the town the year before.

In 1638, Mr. Dummer who had built the Roxbury mill in 1633, was granted the exclusive right to erect a water-mill in Newbury, provided he kept it in serviceable condition to grind corn, and the town agreed to send all of its corn there. In 1645 another grist mill was built in Newbury, a committee having been appointed by the town to procure a mill to "grynde the corne," for which an appropriation of £20 in merchantable pay was made, and ten acres of upland and six acres of meadow, with freedom from all rates for seven years, were included in the grant. In 1679, the town granted twelve acres of land to start another corn mill, and in 1686, it appearing that "the towne being sensible of the great want of another corne mill," a committee was appointed to view convenient places "for ye setting up of a mill." In 1769, the town granted John Emery, Jr., twelve acres of land, provided he would build, within a year and a half, and maintain a corn mill.

In 1636 water-mills were set up at Salem and Ipswich, and two years later the General Court of Massachusetts deemed it desirable to take legislative cognizance of their prevalence by prescribing the weights and measures to be used in them, and that if required, corn should be weighed when it came to and left the mills.

GROWTH OF THE BONUS POLICY IN MAKING THE GRANTS FOR MILLS

The increasing number of colonists and the constant development of trade with the Dutch and English colonies, both continental and insular, and with Europe, had greatly stimulated agriculture in Massachusetts and had materially intensified the demands for flour and bolting mills.

The older towns in the colonies found it desirable, in order to encourage the maintenance of grist mills, to grant small tracts of land, and certain exclusive privileges, as a bonus for the erection of these units.

12.—Bond's "History of Watertown," Appendix, p. 1073, etc.

In 1665, Groton voted to several citizens twenty acres of land, located on the Nashua River, for a mill which the town exempted from taxes for twenty years, and prohibited, for that period, the erection of a mill by any other citizen, except on his own land, and for his own private use. But even with this municipal generosity the original grantees asked to be relieved from their contract, and a new arrangement was made with Captain Clark, of Boston, but it is apparent that, too, fell through, as later five hundred acres of upland and twenty acres of meadow land were granted by the citizens of Groton to John Prescott, of Lancaster, for a mill, which, with the realty, was to be free from charges for a score of years. Either John, or his son, Jonas Prescott, carried out the arrangement, erecting the plant in the district still referred to as the "Old Mill," in what is now the northerly part of the Town of Harvard. By the terms of a further agreement with the Town of Groton, made in 1673, Jonas Prescott was to grind the town's corn every second and every sixth day in each week. Similar arrangements were made with Prescott a few years later for the erection of a sawmill.

These grants of land may seem in these days to be evidences of plenary extravagance and liberality on the part of the municipalities extending them; but the Town of Rutland, which granted nine hundred acres of land to Benjamin Willard, to promote a grist mill on Mill Brook, a branch of the Ware River, was not geographically impoverished by such a course, especially when it is recalled that the terrain embraced in that entire township was purchased of the Indians, in 1686, for £23. So anxious were the townspeople to have Willard provide them with a mill that they exempted the nine hundred acres from taxation and carefully wrote into the grant that this privilege was not to be questioned, "any law or usage to the contrary notwithstanding."

The Town of Hubbardston, located 1,000 feet above sea level, was not exceeded at that time in water power facilities by any New England town of equal elevation, and, in 1793, had within its borders no less than eleven sawmills and five grist mills. The same year there were in Worcester County upwards of eighty grist and flour mills.

In 1661 Goodman Meakins, by agreement with the Town of Hadley, built a grist mill on the west bank of the Connecticut River, but the inconvenience of crossing the river with their grain caused the townspeople to rebel at the tax that was imposed for grinding, and in 1667 they voted to erect a mill on the east bank, and shortly after William Goodwin constructed another on Mill River, at North Hadley. In 1750, Edward Hubbard built one on Fort River, in Hadley.

In 1686-87 Samuel Bartlett was given permission to build a corn mill at Easthampton.

In 1730 Jabez Olmstead built grist mills at Ware, and fifteen years later he erected one at Greenwich.

In subsequent years Enfield, Goshen, North Adams, Adams, Dalton, Pittsfield, Lee, Mount Washington, and other Berkshire towns were provided with grist mills.

MANUFACTURING SALT BY SOLAR EVAPORATION

An important part of the history of any people is the resource upon which their sustenance has depended, and from which their wealth may be derived. It is safe to assert there were no people on this continent whose employments were more varied, or whose resources were more

widely diversified than were those of the colonists who for the first century lived on Cape Cod.

For a hundred and fifty years cod fishing grew in importance, followed by the development of the whale industry. The growth of mackerel fishing, with all its attendant changes in methods, and the change in the tastes of the American people, who, at one time could not be prevailed upon to buy or eat bluefish, now one of the most popular denizens of the sea, also attest the spirit of resourcefulness.

The 150 miles of shore line, greatly increased by the indentations of the innumerable coves and bays of old Cape Cod, have been cultivated from the earliest times for the shell fish found there in greater or less abundance.

At the time of the Revolution the knowledge that 350 gallons of the Atlantic were found to contain a bushel of salt inspired the settlers to make the first practical test of that fact, for, in 1783, a bushel of that commodity was worth $8 and its extraction by boiling was the child of necessity. Six years before the General Court had seen fit to encourage the manufacture by paying a bounty of three shillings a bushel.

Works were rapidly erected all over Cape Cod, where salt was obtained by solar evaporation, a Wellfleet Company being incorporated, in 1821, with capital of $50,000, and before the gradual decline of the business began, upwards of $2,000,000 were invested in salt works on the cape.

In this industry we find evidence of one of the periods of industrial decline which our critics love to cite, for, in 1837, there were no less than 616 separate salt-making enterprises being operated in thirteen of the Barnstable County towns, while in 1845, the total had shrunk to 521, ten years later to 180, and in 1865 to 91. Only Yarmouth and Dennis boasted of salt works in 1885, when each town had one plant. The manufacture of Epsom salt was continued at South Yarmouth until 1888, when, for the first time in seventy-six years, the salt mills along Bass River ceased to revolve and the business of salt making was discontinued on the cape.

The denizens of Barnstable County did not fold their tents and write "finis," but, on the contrary, when they observed in the late '40s that the future of salt manufacture was uncertain, turned to the lowly cranberry and caused this little waif of the swamp lands to become a favorite with the epicures of all lands under the sun. It was a long, hard road to travel, but after decades of experimentation the cranberry has become in recent years the great source of wealth on the cape, and acreage has increased by leaps and bounds.

CHAPTER II

THE ADVENT OF THE PRINTING PRESS

The colonists early devoted their attention to education and the diffusion of knowledge despite the fact that the first few years following their advent were filled with forebodings, anxieties and troubles such as we of this day and generation cannot appreciate.

But eighteen years of life in the wilderness had elapsed since the Pilgrims trod Plymouth Rock and less than half that since the other adventurers had settled in the Massachusetts Bay Colony, when, in 1638, steps had been taken to establish a college in Cambridge, and the first printing press ever installed on the soil of America had been set up in the same town.

Thus there began to be exerted the dual influence of the school and the press, without which American art and industry could not have attained its twentieth century position of world leadership.

The press erected in Cambridge, in 1638, which began its educational work the following year, was brought from England by the Reverend Joseph or Jesse Glover, who had engaged in the mother country a printer, Stephen Day, to operate it for him. Unfortunately, the clerical proprietor died on the passage home, but Day, loyal to his employer's memory, set up the machine and, in January, 1639, printed the "Freeman's Oath,"—the first issue of the Colonial Press.

Of the influences which led Mr. Glover to become so vitally interested in publishing little is known. He was the son of a wealthy non-conformist minister and the principal purchaser and owner of the machinery and stock for printing and book selling, which he intended to promote at Cambridge. Maj. Thomas Clark, Capt. James Oliver, Captain Allen and Messrs. Stoddard, Freake and Hues were associated with him in the venture which, it is thought, originated in the desire of some of the New England ministers and laymen to associate with their school at Cambridge, after the manner of the ministers of Europe, the auxiliary labors of the press.

THE FIRST AMERICAN VOLUME WENT THROUGH SEVENTY EDITIONS

In 1639 Day printed an almanac for that year, written by "William Peirce, Mariner," who was called by some of the settlers "The Palinurus of the Seas." The next year, "The Psalms," newly turned into metre and but recently translated from the Hebrew, with close fidelity to the original, by the Reverends Weld and Eliot, were printed by Day, this being the first production of a volume in book form, it appearing in crown 8vo. style, bound in parchment, and contained 300 pages.

The volume was designed to take the place of Ainsworth's prose translation, previously in use, and although possessed of little merit as a literary composition, it met with extraordinary success, and soon became generally known as the "Bay Psalm Book," no less than seventy editions of the volume being printed during the next 114 years. The first edition printed in England, appeared soon after its American predecessor, and the last

was published in 1754. Five years later the last of twenty-two editions appeared in Scotland.

While Dr. Watts first published his Hymns in 1707, and his Psalms in 1719, sending specimens of both to Cotton Mather, they were not reprinted in America until 1741, the Hymns being published by Dr. Franklin, and the Psalms, in Boston, but they did not supersede the New England Psalms, or the "Bay Psalm Book" until after the Revolution.

Stephen Day, probably reared a printer, was more versed in presswork than in typesetting, as is indicated by his errors of punctuation and of spelling, by the division of monosyllables, by the placing of a hyphen at the end of each line, and by similar technical blunders which would not have been indulged in by an experienced compositor.

Search of the publications turned out by him fails to reveal a single volume in which he placed the imprint of his press on the title page, and in addition to the yearly almanacs, the Bay Psalm Book, two editions of the "Body of Libertys," containing 100 laws of the Massachusetts Bay Colony, edited by Reverend Ward, of Ipswich, one issued in 1645 and the second in 1648, appear to constitute his principal publications.

SAMUEL GREEN SUCCEEDS DAY, THE FIRST PRINTER

In 1649, Samuel Green, who came from England to Cambridge, at the age of sixteen, with his parents who were members of Governor Winthrop's Company, and whose arrival was some eight years in advance of that of Day, succeeded to the management of the Cambridge press.

By some he is referred to as the first printer in North America, but he was not entitled to this honor. As early as October, 1641, the General Court of Massachusetts expressed its appreciation of what his predecessor, Stephen Day, had accomplished by granting him three hundred acres of land, as "being the first that sett upon printing." This grant was confirmed in 1655, and Day died in 1668, at the age of fifty-eight years.

The typographical appearance of Green's products showed no improvement over Day's volumes, and from the general similarity in faults and workmanship it is thought Green had occasionally assisted Day in the press work of the Cambridge enterprise before he took it over in 1649. One of the first works printed by him was the "Cambridge Platform," and in 1650 he turned out a new edition of the "Psalms," revised and improved by President Dunster and a Mr. Lyon.

In 1654, the General Court adopted an order for the regular printing of such laws as were to be published, in impressions ranging from 500 to 700 copies, to be paid for "in wheate or otherwise," at the rate of a penny a sheet, or eight shillings a hundred, a copy to be distributed to each freeman in every town. In October, 1658, the General Court granted Green, on petition, three hundred acres of land, which was subsequently laid out for him at Haverhill.

A SECOND PRESS SET UP IN CAMBRIDGE, IN 1655

In 1655 a second press had been received from England, with type and other materials and was set up in the same building at Cambridge, where Glover's press had been installed, the structure being a substantial brick edifice, which had been erected at a cost of between £300 and £400 for an Indian college, and here for nearly forty years all the printing in the Colonies was executed.

In 1659, a version of the Psalms was printed by Green in the Indian tongue, and in 1660 Marmaduke Johnson, a London printer, settled in

Cambridge. He possessed better qualifications than either of his predecessors.

The second press was designed exclusively for printing the Bible and other works in the aboriginal tongue and in 1661, the New Testament was issued, while two years later, the entire Old and New Testaments, with the New England Psalms in Indian verse, all translated by the Rev. John Eliot, of Roxbury, into the dialect of the Nipmuck or Natick Indians, were issued in quarto form, with marginal notes, and carried a dedication to King Charles II and the imprint of Samuel Green and Marmaduke Johnson. The work had been three years in press and the proprietors had been assisted by an Indian, whom Green had employed as an apprentice, in 1659, and who assumed the English name of James Printer. The young man's father and two brothers were prominent in the Indian churches of the period, and he had received instructions in reading, writing and English, in the Indian school, at Cambridge. Employed by Green as a pressman he was of inestimable service in preparing the Indian publications. In 1682, when the second edition of the volume was in press, Rev. John Eliot, wrote: "We have but one man, viz. the Indian printer, that is able to compose the Sheets and correct the Press with understanding," and when, in 1709, an edition of the Psalter was issued, it bore the imprint of B. Green and J. Printer, in both the English and Indian languages.

THE FIRST BOOK BINDER

It is in connection with the printing of the Bible that the historian finds the first allusion to the introduction of the bookbinder's art in America. John Ratcliffe was sent from England expressly for the purpose of binding the volumes comprising the edition, and, according to a letter written by him to the Commissioners of New England, dated August 30, 1664, he was dissatisfied with the price paid him for the work. It appeared that he could not bind more than one volume a day,—a quantity that is amusing in these days of mass production. He stated 3s. 4d. or 3s. 6d. per book was the lowest figure that would permit him to do the work and live comfortably, inasmuch as out of his pay he was obliged to supply thread, glue, pasteboard, and leather clasps, all of which cost him more than a shilling per volume.

Isaiah Thomas in his "History of Printing" summarizes the expense of this enterprise, which serves as a comparison between present day costs and those of nearly three hundred years ago.

"I have made a calculation from the documents I have seen," he writes, "and find the whole expense attending the carrying through the Press 1,000 copies of the Bible; 500 additional copies of the New Testament; an edition of 'Baxter's Call to the Unconverted;' an edition of the Psalter; and two editions of 'Eliot's Catechism,' all in the Indian language, including the cost of the types for printing the Bible and the binding a part of them, and also the binding of a part of Baxter's Call and the Psalter, amounted to a fraction more than 1,200 pounds sterling."[1]

On the completion of the work, the printing corporation presented the materials to Harvard College, and they were subsequently used by Green under the direction of the officers of that institution.

In 1685, Green printed an edition of 2,000 Bibles, revised by Rev. John

1.—Thomas' "History of Printing," I, 243-245.

Eliot and Reverend Cotton, the work being six years in press, though less expensive than the initial edition.

Soon after the completion of the first edition, Johnson was dismissed, but was allowed to purchase, at their original cost, the fonts of type which he brought over with him. With these, he printed several works in after years, some ten being identified by Thomas, the latest dated in 1674. Johnson died the following year. Green lived until 1702, and died at the age of 87 years. For a long time after his death no printing was done in Cambridge. In the fifty years he was identified with the Cambridge press he printed alone, or with his son, and with Johnson, nearly one hundred books.

THE FIRST CENSORSHIP OF THE PRESS

The General Court, as early as 1662, had set up a censorship of the press by appointing two licensers to determine what works might safely be printed. One or two religious publications, issued that year, were deemed by some to be of heretical tendency, and probably gave rise to the legislative action. The law was short-lived, being repealed in May, 1663, but in October, 1664, apparently because of the freedom exhibited by the press, the legislative body adopted another inhibition "for the preventing of irregularities and abuse to the authority of this country, by the Printing Press," and it was provided that no publications should be issued within its jurisdiction, save in Cambridge, and, further that no person should presume to print anything without first securing a license from the General Court, under the hand of its regularly appointed officers. A penalty was enacted, providing for the forfeiture of the press and of the privilege of printing within the jurisdiction of the General Court in the future.

In 1668, the licensers having sanctioned the issuance of the "De Imitatione Christi," by Thomas á Kempis, the General Court, apparently more vigilant than discriminating, ordered the censors to make a more careful revision of the work, and stopped further printing of the volume. This legislative surveillance and interference continued to be exercised until after the Revolutionary War.

THE FIRST COPYRIGHT LAW AND THE FIRST NEWSPAPER

In 1672, the General Court of Massachusetts adopted the first copyright law ever enacted in America, when it granted to John Usher, a Boston bookseller, the privilege of publishing on his own account, a revised edition of the Laws of the Colony.

In 1674, John Foster, a graduate of Harvard, was given permission to establish a press, which he located in Boston, and two years later he turned out his first book. He also published almanacs and a few other small works. In 1681 he was succeeded by one Sewall.

In 1684, Richard Pierce of Boston, became the proprietor of the next printing press in the Colony, and six years later he gained enduring fame as the printer of the first newspaper ever published in the new world. However, it was short-lived, and so far as known only the initial number was published, as the General Court promptly suppressed the sheet, because, it was alleged, "it came out Contrary to Law, and contained reflections of a very high nature." The sheet bore the date of Thursday, September 25th, 1690, and the imprint, "Printed by R. Pierce, for Benjamin Harris, at the London Coffee House, 1690." The only copy extant, carefully preserved in the office of Colonial State Papers, in London, shows

that Pierce or Harris, or both, had a nose for news, as the brief accounts of local and vicinity happenings there recorded could scarcely have been other than interesting to the Colonists.

Bartholomew Green, son of the Cambridge printer, began printing, in Boston, in 1690 and for forty years published for the General Court, and became the leading printer in the Colony. During the first years of his business he was assisted by John Allen, a London printer, who, in 1707, set up a printing shop of his own.

In April, 1704, Green began publishing *The Boston News-Letter*, printed weekly, and "by authority," for John Campbell, Postmaster, who was the proprietor of the sheet. This was the first successful attempt to publish a periodical in the American colonies, and for fifteen years it was the only newspaper printed in any of them. From 1707 to 1711 Allen executed the printing of the sheet, but when his plant was destroyed by fire, Green again took up the printing of the paper, and, in 1722, became the proprietor of it. The publication remained in the Green family until 1766.

About 1752, an edition of the Bible, in small quarto, was privately printed by Messrs. Kneeland and Green, the former then the publisher of *The New England Journal.* This first American edition of the scriptures in the English language was issued for Daniel Henchman, a Cornhill bookseller, who was commonly regarded as the most enterprising publisher in the Colonies prior to the Revolution. Henchman also built the first paper mill in New England. To avoid the risk of prosecution by those in England, who printed the Bible *cum privilegio,* Henchman saw that it was issued bearing a London imprint. An edition of from 700 to 800 copies was run off the press. Soon afterward a duodecimo edition of the New Testament was printed for Henchman by Rogers & Fowle.

MASSACHUSETTS LED IN PRINTING AND PUBLISHING FOR MANY DECADES

Up to 1740, when eight of the older Provinces were in possession of one or more presses, a greater quantity of printing was annually done in Massachusetts than in all the others combined, and this state led in the publication of books and periodicals until about the beginning of the Revolution.

On January 1, 1775, there were seven newspapers being published in Massachusetts—five at Boston, one in Salem and one in Newburyport, while in all the rest of New England there were but six others. At the same date the Province of New York had but four,—three in New York City, and one in Albany. Altogether, of the thirty-seven newspapers in existence, New England was printing thirteen. Of the entire number of periodicals that had been started in the Colonies between 1704 and 1775—less than 100—of which approximately seventy-five were newspapers and the remainder magazines, twenty-two of them were published in Massachusetts and fourteen in the other New England states.

Some thirty of Boston's pre-Revolution booksellers, operated binderies. The first artisan of this trade was Edmund Ranger, who was engaged in book binding in Boston, as early as 1673, but in the next century Benjamin Gray, Joseph Edwards, Nathaniel Belknap, Samuel Robinson, Bennet Love, Thomas Hancock, John Eliot (a descendant of the "Apostle to the Indians"), Alfred Butler, Charles Harrison, Samuel Eliot, Thomas Rand, Thomas Leverett, Messrs. Wharton & Bowers, William Lang, John Hodgson, Alfred Butler, Jr., Andrew Barclay, Joseph Snelling, John Langdon, Henry Knox, A. Ellison and Richard Fry were among the prominent

book binders of the Hub, the latter also appearing to have been the first blank-book manufacturer of Boston.

In 1760 Bulkeley Emerson was engaged in book binding, at Newburyport, and Mascol Williams, at Salem.

THE FIRST MANUFACTURE OF PAPER

Some fifty years elapsed after the printing press was installed at Cambridge, before paper of any description was manufactured in the Colonies, but, if history is correct, the beginnings here were made within five years after the first white paper was fabricated in England, and by men who were practically unacquainted with the improvements in the art that had been made in that part of Continental Europe where the trade had long flourished.

Under the patronage of the General Court of the Colony of Massachusetts Bay, the second recorded attempt to operate a paper mill, had its genesis on the thirteenth day of September, 1728, when Daniel Henchman, Gillam Phillips, Benjamin Faneuil, Thomas Hancock, and Henry Dering, were granted the privilege, in the nature of a patent for a ten year period, to engage in the manufacture of paper, provided that during the first fifteen months after production was started they made 140 reams of brown, and 60 reams of printing paper; that during the second year of manufacturing they turned out 50 reams of printing paper, in addition to the requirements of the first year, and that in the third and all subsequent years they made 25 reams of a superior quality of writing paper, in addition to the other requirements imposed during the first and second years, and on condition also that from the third year forward the entire yearly product should total not less than 500 reams.

They erected their mill on the banks of the Neponset River, in the town of Milton, seven miles south of Boston, and below the head of the tide, in consequence of which location the mill was forced to suspend operations at least six hours out of each twenty-four on account of the tidal action.

The promoters of the enterprise were not versed in manufacturing operations and they engaged Henry Woodman, an Englishman, as foreman. In 1731 they furnished the General Court with a sample of their manufacture. A few years later operations were suspended, and the property was sold to Jeremiah Smith, who being unable to secure competent workmen, abandoned production there in 1737 and not until 1760 is evidence found that the plant was again used for paper-making. That year, Jeremiah Smith Boies, of Boston, a grandson of Jeremiah Smith, secured a paper-maker named Hazelton, who was attached to a British Regiment then quartered in the town, and whose commander allowed him a furlough, as was quite the general custom at that period where tradespeople were in dire need of experienced artisans. With Abijah Smith, a native of Milton, who had some knowledge of the paper manufacturing trade, Hazelton set the mill once more in operation, but production had scarcely started before the regiment was ordered to Quebec, and, as Hazelton's commander refused to permit him to remain with Boies, he rejoined the colors only to perish from a mortal wound a few weeks later.

A few years afterward Richard Clarke, an Englishman, who had settled in New York, came to Milton, and started operations in the mill. He possessed a superior knowledge of the art of paper making and with

Abijah Smith, who continued with him until he was advanced in years, and with his son, George Clarke, the mill was successfully managed for many years.

THE ENGLISH LORDS OF TRADE INVESTIGATE THE COLONIAL SITUATION

The initial attempt of the Colonists to produce their own paper supplies did not escape the notice of their competitors in England. Through the Lords of Trade and Plantations, the attention of the English government was called to the conditions, and, in 1731, the House of Commons directed the Board of Trade to prepare a report respecting such Colonial activities as might be found "detrimental to the trade, navigations, or manufactures of Great Britain." In pursuance of that order a report was made on February 15, 1731-2, in which the statement was made that among the complaints made to the Board against plantation laws was one to the effect that "in Massachusetts, an Act was made to encourage the manufacture of Paper, which law interferes with the profit made by the British Merchants on foreign Paper sent thither," and the fear was expressed that unless an early cessation of this manufacture, as well as others, was brought about, it and the others would in time be carried on to a much greater extent and thereby injure the trade with the mother country. The Board of Trade added that later accounts received from Massachusetts Bay indicated that the paper made "by a mill set up *three years* ago," amounted "to the value of two hundred pounds sterling yearly."

This report would seem to indicate that the Milton experiment had actually produced paper in a fairly large quantity for that period, but it is apparent that even up to the Revolution the quantity manufactured in the Colonies fell far short of the local demand. The practice of saving rags had not become habitual with the early settlers, and the rather primitive methods of the period gave no heed to assorting the qualities of such rags as were gathered for use, and as chlorine had not been discovered and no bleaching process had been invented, the paper produced was dark in color and often of mottled hues.

Some time prior to 1801 Mark Hollingsworth had been engaged by Jeremiah Smith Boies to operate another paper mill owned by him, and in that year Hollingsworth leased from Boies, or from his estate, the Milton Mill, on the Neponset, and thus began the first step in the succession of ownership of the present day paper-making units known as the Tileston & Hollingsworth Co., the Hollingsworth & Vose Co., and the Hollingsworth & Whitney Co., whose histories will be treated in the chapter of this work devoted to the industries of Norfolk, Middlesex and Suffolk counties.

By 1796, in addition to other local manufactories, Milton had three paper mills, and there were altogether six on the Neponset River, and twenty within the state of Massachusetts. But at the outset of the Revolution, in 1775, there were but three small paper mills in Massachusetts, and one in Rhode Island, the latter being out of repair. There were no others in any part of New England.

THE BEGINNINGS OF THE INDUSTRY IN BERKSHIRE COUNTY

In 1779, twenty-seven years after its settlement, Pittsfield, then a town, instructed its representatives to the General Court, to use their "best endeavors, that any petition which may be preferred from this town, or from any individual of it, respecting the erecting a Paper-mill in this town, be attended to, and espoused by you in the General Court." But a score of years elapsed before the desires of the citizens of Pittsfield

were attained. In 1801, Zenas Crane and his associates, built the first paper mill in that section of the state, in Dalton, and sixty-five years later there were forty paper manufacturing plants in Berkshire County, twenty of them being located in the town of Lee which, in 1866, was the largest paper producing center in the United States.

In 1785, the Massachusetts legislature, notwithstanding the odium attached to anything that savored of a stamp duty, and apparently disregarding what followed in the Colonies succeeding the enactment of the English Parliament's famous statute of twenty years before, reenacted an ordinance which, in 1755, had passed the same body imposing duties on licensed vellum, parchment and paper, a tax of two-thirds of a penny on newspapers, and of one penny on almanacs. However, this law was repealed before it became operative, but it was promptly followed by another which imposed a duty on advertisements, and which remained on the statute books for two years.

By 1790, less than a decade after the Revolution, the paper manufactured in Massachusetts was valued at £20,000 annually, and by 1795 about twenty mills were operating in the state, of which total six were on the Neponset River, seven were on the Charles, with one at Worcester, one at Sutton, another at Springfield, and one in Andover. In most instances each mill had two vats, and employed on the average ten men, and the same number of boys and girls. The annual product was about 70,000 reams of writing, printing and wrapping paper, and a two-vat mill required capital of about $10,000, and had a capacity of producing between 2,000 and 3,000 reams annually of the various grades of papers then manufactured. At that period the price of printing paper ran from $3. to $3.50 per ream.

EARLY WALL PAPER PLANTS AND TYPE FOUNDRIES

When the Secretary of the United States Treasury issued his first census of manufactures in 1810 the manufacture of paper-hangings, or wall paper as it is referred to in these more modern days, was among the well established branches of American industry. In 1813 there were sufficient manufactories of "stained paper," or paper hangings, in Boston, to take care of all the needs in Massachusetts along that line, and to furnish considerable quantities to the other Commonwealths.[2]

There were also in Boston or vicinity, at the same period, two or three factories engaged in the manufacture of pasteboard, fullers', sheathing, cardboard, cartridge and wrapping papers.

Of other industries collateral to printing, binding and paper making, the trade of type-foundering was carried on in the Colonies as early as 1768 when a foundry was set up in Boston by a Mr. Michelson, of Scotland, who manufactured types said to be the equal of those imported from Great Britain.

2.—Mass. Historical Collections III, 276-277.

CHAPTER III

THE FIRST BRICK-KILN BUILT AT SALEM

In 1629 the first brick-kiln erected in Massachusetts was located at Salem. As authority for the date and place, the minister of that town wrote, about July 1 of that year, as follows: "It is thought here is good clay to make Bricke, and Tyles and Earthen pots, as need to be. At this instant we are setting a brick-kill on worke to make Brickes and Tyles for the building of our houses. For stone, here is plentie of slates at the isle of slates, in Massathulets Bay, and Lime-stone, Free-stone, and smooth stone and Iron-stone, and marble stone, also in such store, that we have great Rockes of it, and a harbor hard by. Our plantation is from thence called Marble Harbor."[1]

It is clearly apparent that even at that early date the settlers of Salem were aware of the existence of lime stone, marble, and clay suitable for the manufacture of brick, and that they intended to turn these deposits to their pecuniary and utilitarian advantage. That same year 10,000 brick had been sent from London to the colony for use in the construction of fireplaces.

However, there is no evidence showing that any structure was built entirely of bricks in the Colony until 1638, when a house of that type was constructed in Boston, by Mr. Coddington, one of the leaders of the Rhode Island settlement, and five years later a brick watch house was built on Fort Hill, in Plymouth, the bricks being furnished by a Mr. Grimes, at eleven shillings per thousand.

That there were bricklayers in the Colony as early as 1630 is clear, for at the first Court of Assistants, held in Charlestown, that year, the rate of wages for mechanics was fixed by an order to the effect that carpenters, joiners, bricklayers, sawyers and thatchers, should receive no more than two shillings a day, under penalty of a fine of ten shillings being imposed upon employer and employee. This order was repealed the following March, and, as such attempts to regulate the rate of pay by legislation or other fiat seemed to repel, rather than encourage, labor, which was none too plenty, all restrictions of that nature were removed in 1640.

As early at 1647 brick making was carried on at Mystick, the old name for Medford, and the product was largely sold in Boston, being easily transported there by water. Lime, brick and tile manufacture were pursued in the Colony as independent trades at that period, and, in 1657, the use of brick had become so general in Boston that a writer described the town as having "large and spacious houses, some fairly set forth with brick, tile, slate and stone, and orderly placed, whose continual enlargement presageth some sumptuous city."

FIRST APPLICATION OF THE POLICE POWER OF THE COMMONWEALTH

Ten years later the General Court appointed a committee to frame a law that would regulate the size and the process of manufacture of bricks,

1.—Higginson's New England Plantation, 1 Mass. Hist. Coll., VI, 118.

and, in 1692, legislation was enacted requiring all buildings above a specified size to be constructed of stone or brick, and to be covered with slate or tiles, this being the first application of the police power in regulating the type of building construction and the advance agent of our now universally prevalent fire limit provisions. It was inspired because of the "great desolations and ruins" occurring when disastrous fires of contiguous wooden structures swept over Boston, and other colonial communities. It is also indicative of the fact that the colonies were no longer dependent on importations of bricks, but were able to manufacture enough to provide building material that would comply with the laws.

Following the Revolution, Medford annually produced about 4,000,000 bricks, while in Boston, Dorchester, Charlestown, and a few of the other older communities, there were brick-kilns in the pre-Revolutionary period.

THE EARLY GLASS MANUFACTURES

Probably the first manufactory of glass in the Massachusetts Bay Colony was carried on in the village of Germantown, in the town of Braintree and production was confined to glass bottles. Some years prior to the Revolution, the proprietors found themselves in financial difficulties, and the factory having been destroyed by fire, it was never rebuilt.[2]

As early as 1639, the earliest glass works in New England to which an accurate date can be applied, were established at Salem, when the town "granted to the glass-men several acres of ground adjoyning to their howses," on condition that Ananias Concklin, Obadiah Holmes and Lawrence Southwick, each of whom was given two acres of land, would proceed to set up glass works there.

The next year a fourth promoter, John Concklin, was allotted five acres, contiguous to the grants of 1639, and in December, 1641, the General Court, desiring to encourage the enterprise, authorized the town of Salem to loan the proprietors of the work thirty pounds, which amount was to be deducted from the next tax-rate, and to be repaid to the municipality by the glass workers "if the work succeeded" and, "when they were able." It appearing that the works had been neglected for three years, the General Court granted permission to the Messrs. Concklin to form a new company and carry on the business, which it is apparent was done as, in 1661, the Colonial Records mention the Glass House Field, in Salem. Presumably nothing more than glass bottles were produced there.

The records are singularly silent for substantially a century in so far as alluding to the development of this manufacture in the colonies and provinces, and no further legislation seems to have been enacted by the General Court until December, 1752, when that body passed an act granting to Isaac C. Winslow et als the *sole* privilege of manufacturing glass in the Province.

In July, 1787, the General Court granted a charter to a Boston company giving it the exclusive right to manufacture glass in Massachusetts for a period of fifteen years, and providing a penalty of £500 for each infringement of the privilege.

Furthermore, the capital stock employed was exempted from taxes for five years, and all workmen employed, from all military duties. The promoters first erected a brick factory, at the foot of Essex Street, in the form of a pyramid, but the building being found ill adapted to production, it was razed, and a wooden structure, 100 by 60 feet, lined with brick,

2.—Mass. Hist. Coll. III, 276.

was constructed. Lack of skilled labor prevented operations being undertaken until November, 1792, and the manufacture of crown window-glass was said to be of a quality equal or superior to that imported. Materials were reported abundant, and, by 1798, the production had been stepped up to 900 sheets per week, which sold at $1.75 each, yielding an income of some $76,000 a year.

THE PRECURSOR OF THE VOLSTEAD ACT

As early as November, 1637, the General Court took legislative cognizance of the brewing industry, by providing that "no person shall brewe any beare, or malt, or other drinke, or sell in gross or by retaile, but only such as shall be licensed by this Courte, on paine of £100; and whereas Capt. Sedgwick hath before this time set up a brewe-house at his greate charge, and very comodious for this part of the countrey, hee is freely licensed to brewe beare to sell according to the size before licensed dureing the pleasure of the Courte." It appears that the "size" referred to a previous order that the "beare" could not be "stronger" than could be sold at eight shillings the barrel, under penalty of a fine of £20.—undoubtedly was the seventeenth century predecessor of our present Volstead Act, although couched in legislative phrase somewhat different from existing inhibitions.

In view of the recognition of the brewing interests by the law-making body,—the first that seems to have been recorded anywhere in the Colonies,—one can but wonder whether the sanction of the legislature was not sought because of promiscuous boot-legging activities then prevalent which it was believed could be curbed only by this legislation. In the volume entitled "Wonder-Working Providence," the statement is carried that among the trades in New England that had "fallen into their ranks and places to their great advantage, were brewers, besides divers sorts of shopkeepers, and some who have a mystery beyond others, as have the vintners."

In 1641, John Appleton, one of the early settlers of Watertown, and a cultivator of hops, was given permission to set up a malt-house. Samuel Livermore was also a large grower of hops, in Watertown, in 1667.

It was many years thereafter before barley was raised in the colonies in sufficient quantity for the production of malt and beer. Each year the importations of malt from the mother country were considerable, and subject, in Massachusetts, to an import duty, which, by 1655, had become so onerous as to result in the preparation of a petition by the principal Boston importers of it, who were joined by other merchants, requesting a reduction or repeal of the tariff, which they said was "pinditiall (prejudicial) to this comonwelth and also a discoridgmt to marchants."

One of the petitions of these early Boston proponents of free trade, written by Thomas Broughton, and signed by him and Robert Pateshall, represented that "the well-known advantage accruing by freedome of ports and hindrance of trade proportionally according to largeness of customs imposed, that this seeming good may not bring upon this countrey a reall evell, and from customs upon one thing grow to custome on another, till, step by step, under specious pretences, we are insensiblie brought under taxes for everything, as the woful experience of other nations well known unto us showeth," therefore, "for the good of the present, and to prevent this evell in future ages, we are become your humble petitioners to remove the customs upon malt, that after ages may

remind you as fathers of their freedome, and the present may bow before you for their experience if you care of theire wellfare"[3]

THE LEGISLATURE ESTABLISHES THE FORMULA

The General Court ordered that beer should be made with four bushels of good barley malt at least to a hogshead, and that it should not be sold above 2 *d.* the quart, and later it was provided that beer should be made only of "good barley mault," without "any mixture of molasses, coarse sugar, or other materials instead of mault, on penalty of five pounds for every offence."

The prices of barley, barley-malt, and rye were fixed, in 1667, for that year, at four shillings per bushel; wheat, at five shillings, and Indian corn at two shillings, 8 pence the bushel.

Apparently, the adherents of the protective tariff policy were in the majority in the General Court, as, in May, 1673, that body, taking into consideration "the necessity of upholding the staple commodities of this country, for supply and support of the inhabitants thereof, and finding, by experience, the bringing of malt, *which is a principal commodity* of this country, from foreign ports, to be exceedingly prejudicial to the inhabitants of this Colony," imposed a duty of six pence a bushel on malt imported from Europe, in addition to the rate of one penny previously charged.[4]

The rugged and virgin soil of the colonies was found to be teeming with an abundance of wild grapes, and soon after his arrival, Governor Winthrop began their cultivation. In 1630, Higginson said: "Excellent vines are here up and down in the woods. Our Governor hath already planted a vineyard, with great hope of increase." One can but wonder upon what type of libation Master Graves, "Engynere," thrived when he declared that the native grapes were the largest he had ever seen, some of them measuring "foure inches about."

The rental of Governor's Island, in Boston Harbor, which was exacted from Governor Winthrop, was a hogshead of wine annually, on condition that he should plant thereon a vineyard or an orchard.

Probably the Colonists did not long carry on extensive attempts to manufacture wine, for, within a few years after the settlement of Massachusetts Bay the rapidly increasing foreign commerce afforded a cheaper and readier means of supply of wine, this commodity constituting the principal return cargoes of Boston ships operating between the West Indies, Portugal, and the Wine Islands, and necessitating, by 1645, action by the General Court, which imposed a duty of ten shillings on every butt of Spanish wine landed in Boston.

THE MANUFACTURE OF SALT BEGINS AT SALEM

As early as 1622 a salt maker from England was sent to the Plymouth colony, and while Governor Bradford discounted his abilities it appears that later he was sent to Cape Ann to try his experiments there, but not until 1636 is there any record of the manufacture of salt in that locality. In that year, apparently by private enterprise, but under leave of the General Court, the production of salt was begun, at Salem, and in June, 1641, Samuel Winslow obtained from the Legislature, the exclusive right for ten years of making salt by a new method, providing he set up his

3.—Drake's Antiquities of Boston.
4.—Colony Records, Vol. IV, 344, 552.

works within twelve months. The same year, John Jenny, of Plymouth, and four associates, were given 30 acres of land, on Clark's Island, "the first land that received the footsteps of the Pilgrims," and a monopoly for twenty-one years, to produce salt, but they were required to sell the commodity to the inhabitants at two shillings a bushel.

These initial atempts were inadequate to supply the needs of the colonies, and the scarcity of salt was a cause of considerable anxiety. The importance of enhancing the domestic production induced the General Court to give consideration to the manufacture of salt by a new method. In March, 1647-8, it was enacted that "upon treaty with Mr. Winthrop, touching the making of salt out of meer salt water, for the use of the country, it is apprehended and assented by both parties, that for incouragement of the said worke, being of so general concernment, it is enacted by authority of this Court, that for so many families or households as are resident within this jurisdiction, Mr. Winthrop shall be paid after the next harvest, so many bushels of wheate or of either corne and wheate to the value of wheate, yet so as the one half of it be in wheate certaine upon the delivery of so many bushels of good white salt at Boston, Charles Towne, Salem, Ipswich, and Salisbury, to be received and paid for by the Commissioners for public rates upon two months' notice given by Mr. Winthrop—the constables shall have power to levy it. The second year the commission shall receive and pay for two bushels of salt for each family, at the price of 3*s*. a bushel, and for other two years, the commission shall take of, and make payment for two hundred tons of salt at 2*s*. per bushel, at such Salt works as said Mr. Winthrop shall appoint, and he shall have leave to erect works in any place or places in the jurisdiction not appropriated."

The next May, the legislature granted Winthrop 3,000 acres at Paguatuck, the grant to be void "provided that he set not up a considerable salte worke, we meane to make one hundred tun per annum of salt between the Capes of Massachusetts Bay, within three years next coming."

While history seems to be singularly reticent as to the outcome of the undertaking, it appears reasonable to conjecture that it was successful inasmuch as in May, 1656, the General Court granted for twenty-one years, to the same proprietor, the exclusive privilege of making salt, "after his new way." Four years before, Edward Burt had been given legislative sanction to make salt, for a period of ten years, at Salem, "provided he make it only after his own new way."

PRODUCING SALT BY SOLAR EVAPORATION

In 1671, a committee, appointed in October of the previous year, by the General Court, to confer with Richard Wharton, of Boston, respecting his method of manufacturing salt by the rays of the sun, reported favorably, and recommended that the Legislature "encourage a Company for that purpose, which return the Court approved."

The interruption of receipts of salt, from England, which occurred during the Revolutionary War, was chiefly responsible for the establishment on Cape Cod of almost innumerable small salt manufacturing units where the water was pumped from the Atlantic by hand or by the power provided by windmills, then boiled in large kettles, often in the open air, the resulting deposit being a very inferior grade of salt.

Two hundred and fifty gallons of sea water were required to make a bushel of salt.

About 1774 or 1775 a group engaged in boiling salt at Harwich

observed saline particles deposited by the sun and air in the clamshells lying on the beach, and this observation soon led to the initial attempts undertaken on the Cape, upon an extended scale, to produce salt by solar evaporation.

A year or two later, John Sears, a Cape Cod mariner, joined with Edward Sears and Christopher and Edward Crowell, in an association, and erected salt works on Quivet Neck, in Dennis, where they constructed a vat 100 by 10 feet, with a flooring of white pine resting on oak sleepers, with planked sides and ends, and a curiously contrived roof. The "bottom" originally built on the same level, was subsequently divided to obtain a crystallizing vat. For two years, the sea water was carried from the shore to the vat in buckets, but in the later years of the Revolution a pump was obtained from the British ship of war, *Somerset,* then stranded on the Cape, and this furnished the motive power until 1790, when Sears erected a windmill, which was denominated as "John Sears' Folly."

Obed E. Smith and Job Chase operated works for twenty years, at Harwich, prior to and through the Revolutionary War period, and similar enterprises were also in existence at Falmouth and Barnstable, at that period. Scott Clark and Rev. Mr. Dunster erected works, with three vats each, at Broad Point, Brewster, before the termination of the war, and at about that period Nathaniel Freeman operated salt works in the same town.

In 1779, Messrs. Hinchley and Gorman built salt works, in Barnstable, "on the new plan."

During the Revolutionary period salt sold for six dollars a bushel, and many small producing units grew up on the Cape, adopting the method used by John Sears.

In 1799, he was given a patent on the manufacture of salt, and the next year one was awarded Hattil Killey, applying to a method evolved by him for covering salt-vats from the elements. This contrivance, by which the roofs of two vats were connected by a strong beam which turned upon an upright post in the center, enabling these temporary roofs to be removed and replaced, proved to be an improvement on the old system where the salt was exposed in uncovered boilers or vats. Salt made by this method was of good quality, white and pure, and weighed from seventy to seventy-five pounds a bushel. Carried on as it was by the use of three or four areas on different elevations the separation of the various sulphates and other contaminating impurities was effected, and the process proved more economical, inasmuch as the Epsom and Glauber salts that were gathered as residual, or by-products, of the operation, yielded additional revenues.

General Palmer set up on the marshes of Boston Neck, at about the Revolutionary period, a plant to manufacture salt by the solar evaporation method, but the attempt proved abortive.

CHAPTER IV

THE GENERAL COURT SURVEYS THE CLOTHING SITUATION

During the twenty years succeeding the first settlement at Plymouth, and the ten years following the beginnings of the Massachusetts Bay Colony, not less than 4,250 families and 21,200 souls had arrived in New England, which, coupled with the diminishing intercourse with the mother country, presented a difficult and uncertain condition in the supply of clothing and other necessaries of life. In consequence, the attention of the Colonists was early turned to the manufacture of their own linen and woolen garments, and their determination to supply their own needs was further enhanced by the opportunity presented by their trade with Barbadoes, where a cheap supply of cotton was available in exchange for the commodities shipped there.

On May 13, 1640, the General Court approached the situation in these words: "The Court, taking into serious consideration the absolute necessity for the raising of the manufacture of linen cloth, doth declare that it is the intent of this Court that there shall be an order settled about it, and therefore doth require the magistrates and deputies of the several towns to acquaint the townsmen therewith, and to make enquiry what seed is in every town, what men and women are skilled in the braking, spinning, weaving, what means for the providing of wheels; and to consider with those skilful in that manufacture, and what course may be taken for teaching the boys and girls in all towns the spinning of the yarn, and to return to the next Court their several and joint advice about this thing. The like consideration would be had for the spinning and weaving of cotton wool."[1]

Here we see the germ of an industrial survey—an attempt sanctioned by the legislative body to ascertain what the resources were that could be applied to the manufacture of clothing of various kinds.

From that day to within two or three generations ago it was the custom, in the rural districts especially, for the women to manufacture a portion of their coarser clothing, and at some periods and in many places, nearly the whole of their apparel and household linen, from cotton, flax, or wool, either separately, or in combination.

On October 7, 1640, an order of the General Court, previously adopted, offering for a period of three years, a bounty of three pence on every shilling's worth of linen, woolen and cotton cloth, "according to its valewation for the incuragment of the manifocture," was declared to apply only to cloth made in the jurisdiction of the legislative body, and of yarn spun there from materials raised within the area "or else of cotton." On June 2, following, the order was repealed on the ground of being too burdensome. But previous to this action, Goodman Nutt, Martin Vaderwood, John Whitney, Henry Kimball, and John Witheridge, were granted, on April 29, 1641, an allowance for 83½ yards, valued at

1.—Colony Records, I, 294.

12 pence per yard.[2] So far as the records show this was the first sample of cloth woven in this country, and probably it was a coarse type of linen.

ENCOURAGING LINEN AND CORDAGE PRODUCTION

In June, 1641, following the award of premiums on linen, the General Court directed, as a means of supply "till cotton may bee had," that wild hemp should be gathered and improved, and heads of families were to be instructed in the methods of harvesting and employing this raw material, then "growing all over the country" and which already was used in making nets, mats, and lines. That same year, the residents of Salem were called together to discuss the extension of hemp culture, the seed of which was first planted there, in 1629. The ponds in which the pioneer cultivators rotted their flax early acquired the name of Flax Ponds.

In 1641, John Harrison began the manufacture of cordage, from hemp, in Boston, and, in 1662, John Heyman, of Charlestown, was given permission to make ropes and lines.

In March, 1642-3, an act, designed as a special favor to the New England plantations, passed the English House of Commons, by which all merchandise intended for their use, and all Colonial produce later exported to England, were exempted from duties, subsidies and taxation. Although the intent of this act was to stimulate the industry of the Colonists, it probably hindered rather than promoted the domestic manufacture of clothing and other staple articles of English export, really furnishing facilities for a cheap and constant supply of the manufactures of the mother country, as it rendered the Colonists simply producers of raw materials. A few years later, the confirmation of this law, in a modified form, formed the foundation of the famous Act of Navigation.

THE ADVENT OF WORKERS IN WOOL

On May 14, 1645, the General Court adopted an order looking toward the preservation and increase in sheep, in order that the domestic supply of wool might be enhanced, and three years later further legislation was enacted providing for the pasturing of sheep on the commons and offering bounties for the killing of wolves, which harassed the flocks. In 1654, a drastic law was passed preventing the exportation of sheep, and even the killing of any for food under two years of age, save for the use of the owner's family. In 1675 the Court went a step further and prohibited the exportation of wool, the islanders on Nantucket having built up a trade with France in this commodity.

Among a number of regulations designed to encourage the infant Colonial industries, the General Court, in May, 1656, passed an act in regard to spinning, which, in some respects, was one of the most important placed on the Colonial statute book. "For the improving as many hands as may be in spinninge woole, cotton, flaxe, &c," the Court ordered "that all hands not necessarily employed on other occasions, as women, girls and boys, shall and hereby are enjoined to spin according to their skill and ability, and that the selectmen in every town do consider the condition and capacity of every family, and accordingly do assess them as one or more spinners." The legislation set forth the rates of assessment to be levied by the selectmen, ordered them to keep the commons clear for sheep, and to provide rams for the flocks, while the various deputies in the towns were to urge the sowing of hemp and flax seed.

2.—Colony Records, I, 316.

Probably in furtherance of this somewhat mandatory legislation there were made in a number of towns at about this period efforts to introduce the art of weaving. In 1656, William How was admitted as an inhabitant of Chelmsford, and was alotted twelve acres of meadow and eighteen acres of upland, "Provided he set up his trade of weaving, and perform the town's work." He became the first weaver of that municipality.

In May, 1662, Thomas Agar, of Roxbury, a fuller by trade, bought of Timothy Hawkins, three-fourths of an acre of land, in Watertown, upon which he erected a fulling mill. In December, 1663, he sold the mill and land to Thomas Leveran, a Dedham, Eng., cloth worker, who had come to the colony. In 1669-70 it was re-conveyed to Hawkins and Benjamin Garfield.

Watertown's second fulling mill was built previous to November, 1686, on Mill Brook, adjoining the first water-mill which had been erected about thirty-five years before by Edward How and Mr. Cradock, and which was owned by How, Thomas Danforth, and others, at the time the fulling mill was constructed.

In 1681, Messrs. Draper and Fairbanks erected a fulling mill on Mother Brook in Dedham an artificial canal, three and a half miles long, built in 1639, which carried some of the waters of the Charles into the Neponset River, and which has furnished water power to numerous factories for almost three centuries. This enterprise divides honors with Mill Brook, in Watertown, as being one of the two oldest canals in the United States.

A BOSTON EXPERIMENT IN LINEN MANUFACTURE

In the next century a determined effort was made to set up a linen manufactory, in Boston, following a public meeting at which a committee of seven was appointed to report on the propriety of establishing "a spinning school or schools, for the instruction of the children of the town."

The movement culminated in the erection on the east side of what was then Long Acre, but now Tremont Street, near Hamilton Place, of a large brick building, bearing on the street wall the figure of a woman holding a distaff. On the occasion of the opening of the factory, the women of Boston, rich and poor, appeared on the Common, with their spinning-wheels, and vied with each other in proficiency. Public subscriptions were opened in behalf of the project, and, in 1737, the General Court levied a tax on carriages and other luxuries, the money to be applied to the support of the enterprise. For a few years it prospered, but was soon abandoned, and the building which stood until after the Revolution, was later used for the manufacture of worsted hose, metal buttons, and other commodities.

Hon. Daniel Oliver, a Boston merchant, erected about the same period, at an expense of £600, a "spinning school," for the employment of the poor, and, at his death, in 1731, he devised the building to trustees to be used for educational purposes for the poor children of the town.

In 1722, the General Court came to the aid of the sail-duck and linen industries, providing the products were made in Massachusetts and of domestic raw materials, and four years later, John Powell, of Boston, memorialized the Legislature by stating that he had found locally grown hemp and flax as well adapted to the manufacture of sail-cloth, as that imported from Great Britain and Ireland, and announced his willingness to put twenty looms at work within fifteen or eighteen months, if suitably encouraged, and to send to England for workmen and utensils, which

would require him to make an outlay of £500 for each loom, the capacity of which would be fifty pieces of duck per annum. In June, of that year, the Legislature recommended a bounty of twenty shillings to be paid out of the public treasury for each piece of duck or canvass "thirty-six yards long and thirty inches wide, a good even thread, well drawn, and of a good bright color, being wrought wholly of good strong water-rotted hemp or flax, of the growth of New England, and that shall weigh between forty and fifty pounds, each bolt, and for fourteen years, as is usual in Great Britain and elsewhere, and the memorialist be allowed £3,000, he giving such security as your Court may appoint, £2,000 in hand, and the other one thousand when he has perfected five hundred pieces of canvas, that shall pass the survey."

In 1753 the excise tax on carriages, originally enacted in behalf of the Boston linen manufactory, was renewed by the General Court, this time for the support of spinning schools, and each town was allowed to send at least one person to be instructed in the art, free of expense. In 1762, public notice was given that the spinning school in the "Manufacturing House," presumably the linen factory building, on Tremont Street, Boston, was again opened, where any person might learn to spin, gratis, and after the first three months would be paid for spinning. A premium of £18 was at the same time offered to the four best spinners.

As early as 1672 a company of hatters in Massachusetts requested special privileges of the Legislature, which were promised "when they should make as good hats and sell them as cheap as those imported were." By 1731, there were sixteen hatters in business in Boston, one of whom was said to have commonly finished forty hats a week.

Ames' Almanac, for 1769, asserts that a gentleman "whom posterity will bless," placed in the hands of the Selectmen of Boston the sum of $100 to be distributed in sums of $40, $30, $20, and $10, to the persons who, in 1771, should have severally raised the largest number of mulberry trees, in Massachusetts.

In 1770, in reply to a petition filed by William Molineaux, of Boston, seeking aid for a plan designed to employ the poor in spinning, dyeing, and manufacturing silk, the General Council of the Province granted him free rent of the provincial manufactory for a period of seven years, providing he would engage in the manufacture of silk. Molineaux represented that he had invested approximately £1,200, in machinery, and he advertised that he would purchase, at a reasonable price, all the raw silk raised in the Province. Fine samples of sewing silk were produced at that period in various parts of the Commonwealth, and, in 1790, forty thousand yards of lace were manufactured in Ipswich.

Elisha and John Brown were given the right by the Province Council "to improve looms for the linen, or cotton and linen manufacture, to keep three looms constantly employed for the space of one year, and, after that, four looms for the said purpose for the remainder of the term of seven years, paying (as in the Molineaux grant) five peppercorns annually."

Probably the Molineaux experiment approached more nearly than any previous venture the character of a manufactory, and production was at least partly of worsted commodities, the equipment which he installed consisting in part of some type of self-acting machinery, which would enable two boys to keep fifty looms employed upon the yarn supplied by the spinners.

It is the earliest mention of any improved mechanism in cloth manufacture.

In 1788, Giles Richards & Co., began the manufacture, in Boston, by machinery, of cotton and woolen cards, and five years later this factory, with those operated by Amos Whittemore and Mark Richards, were turning out 12,000 dozen cards annually, while smaller units were operated in Boston, and other parts of Massachusetts.

THE INCEPTION OF OUR COTTON TEXTILE MACHINERY PLANTS

The genesis of our unrivaled supremacy in the manufacture of cotton machinery is found in the enterprise of Honorable Hugh Orr, of Massachusetts, a pioneer in many manufacturing lines, who employed, in 1786, two brothers, Robert and Alexander Barr, of Scotland, to construct for him at his works, in East Bridgewater, three carding, roping and spinning machines. A committee representing both houses of the Legislature was appointed to examine them and a grant of 200 pounds was concurred in to enable the Barrs to complete the devices. Six tickets in the State land lottery (in which there were no blanks), were granted to them "as a reward for their ingenuity in forming these machines, and for their public spirit in making them known to this Commonwealth." Can the reader conjure up any such favorable action by a modern legislative body? On the contrary the attitude of the law-makers of today would probably be to hedge about any such constructive industrial activity with inhibitions such as now fill the statute books of manufacturing states.

The Barr machines, which cost to build 187 pounds, are believed to have been the first Jenny and stock card made in the United States, and from this modest beginning has grown the great textile machinery plants that dot Massachusetts today, and whose products in 1925 sold for upwards of $51,000,000.

While these machines were being constructed, Thomas Somers presented a petition to the General Court, stating that having been reared in cotton manufacture abroad, he had visited England at his own expense to prepare machines for carding and spinning, and with difficulty, had brought to Baltimore descriptions and models, but finding little interest in cotton production there, he asked the financial assistance of the law-making body to aid him in setting up a manufactory, and on March 2, 1786, the Legislature, in consideration of his having such models and descriptions, and a knowledge of adapting the thread for the weaving of dimities, plain, striped and checked muslins, calicoes, jeans, jeanettes, and other cotton products, ordered twenty pounds to be deposited in the hands of Hugh Orr to encourage him in a trial. This model of an early and imperfect type of the Arkwright machine, appears to have been exhibited, with the others, and was frequently referred to as the "State's Model." Of course, Mr. Orr did not escape the then prevalent criticism that he desired to supersede honest manual labor by the introduction of his inventions.

As early as 1788 or 1789, a large manufactory of cotton sail duck was established in Frog Lane, Boston, where a factory 188 feet long, and two stories high, was erected and equipped, the company being incorporated by the General Court, and encouraged by a bounty upon its manufacture.

The regulations adopted by the employees were designed to encourage greater perfection in workmanship. The weavers and spinners each formed into a society for the mutual aid of the workers, with a system of laws designed to govern the factory activities. Quarrels, profanity, or other misconduct were immediately adjudged on the spot by a jury of

the weavers—the first instance one finds of the modern Works Council—and a fine, deducted from the wages of each offender, was deposited in a common fund for the relief of sick members. Careless workmanship was similarly penalized, and the goods, if found to be unsalable, were to be supplanted by perfect products made by the employee who originally manufactured the imperfect articles. No employee could be admitted to the spinners group except by vote of the members.

The duck produced at the factory was said to be the best seen in America, and it sold at a lower price than the imported article. The ship, *Massachusetts,* 800 tons, built about 1790, was entirely outfitted with its sails and cordage wholly of Boston manufacture. In 1792, the factory was producing about 2,000 yards of duck weekly, and employed 400 hands, and for a number of years thereafter the annual production ran between 2,000 and 3,000 bolts, of forty yards each, the price of which was $13 per bolt.

President George Washington, writing on October 28, 1789, of his visit to this factory, and the carding mill, said: "They have 28 looms at work, and 14 girls spinning with both hands, (the flax being fastened to the waist). Children (girls) turn the wheels for them, and with this assistance each spinner can turn out 14 pounds of thread per day, when they stick to it; but as they are paid by the piece, or work they do, there is no other restraint upon them but to come at 8 o'clock in the morning, and return at 6 in the evening. They are daughters of decayed families, and are girls of character—none others are admitted. The number of hands now employed in the different parts of the work is ____, but the managers expect to increase them to *__ .__This is a work of public utility and private advantage. From hence I went to the card manufactory, where I was informed were about 900 hands of one kind, and for one purpose or another, all kinds of cards are made; and there are machines for executing every part of the work in a new and expeditious manner, especially in cutting and bending teeth, which is done at one stroke. They have made 63,000 pairs of cards in a year, and can undersell the imported cards—nay, cards of this manufactory have been smuggled into England."

* George Washington did not fill in figures.

CHAPTER V

LEATHER MANUFACTURE BECAME AN ESTABLISHED INDUSTRY

On June 14, 1642, the first law was passed by the General Court to regulate the manufacture of leather in Massachusetts, thus indicating that at this early period it was becoming an established industry. It provided that no butcher, currier, or shoemaker should exercise the trade of a tanner, and provision was made for the towns to appoint one or more sealers or markers of leather. This act was followed by the passage of another measure on November 4, 1646, prohibiting the exportation of raw hides, skins, pelts, or unwrought leather.

In 1648, the coopers and shoemakers of Boston and the vicinity had so far increased in number, that each craft sought and obtained certain corporate privileges from the legislature. On October 18, the General Court granted to "Richard Webb, James Everall, Robert Turner, Edmund Jackson, and the rest of the shoemakers," an act of incorporation with power to regulate the trade for three years. Although no political or exclusive privileges beyond the regulation of their own trade affairs appear to have been conferred, Johnson, in his "Wonder-Working Providence" considered it of much service to the craft, and observed: "All other trades have here fallen into their ranks and places to their great advantage; especially coopers and shoemakers, who had either of them a corporation granted, inriching themselves by their trades very much."

"As for tanners and shoemakers," he adds, "it being naturalized in these occupations to have a higher reach in managing their manufactures than other men in New England, and having not changed their nature in this between them both they have kept men to their stander hitherto, almost doubling the price of their commodities according to the rate they were sold for in England, and yet the plenty of leather is beyond what they had there, counting the number of people, but the transportation of boots and shoes into forraign parts hath vented all, however."

Cardmakers, glovers, fell-mongers, and furriers are also mentioned in a lengthy list of those who had "orderly turned to their trades" in 1651. The shoemakers and tanners appear not to have been the only ones who possessed the secret of advancing their own interests by arts often regarded as of later origin. "As for tailers," says Johnson, "they have not come behind the former, their advantage being in the nurture of new fashions all one with England."

REMARKABLE PROGRESS IN TWO DECADES

That leather, within little more than twenty years from the first settlement, should have become relatively more plentiful than in England, and that boots and shoes should in the same time become an article of export, appears almost incredible. The scarcity of leather is expressly assigned, in a sumptuary law in 1651, as constituting the reason for prohibiting, along with gold, silver, silks, laces and other extravagances of

dress, the wearing of great boots by those whom the selectmen selected as being unable to afford such a luxury. Shoes appear, however, to have been early exported by the merchants of Boston, at this period. A few, chiefly of calfskin, were bought in Lynn, where the business had begun to take root.

"Stuff shoes," for women's use, afterwards extensively manufactured at Lynn, were at this early date worn only by the wealthy, and upon wedding occasions by the less opulent, who thenceforth preserved them as too costly for ordinary use. Before the Revolution calfskin shoes were rare, and morocco leather was not made in this country until after the war. The laboring classes wore neats' leather shoes during the Colonial period.

It was probably inexpedient, because of the general scarcity of merchants, to attempt to restrict the workers in leather too closely to one branch, as contemplated in the Act of 1642. A memorial to the General Court, in 1666, signed by Nathaniel Bishop and Hope Allin, curriers, praying that tanners and shoemakers might not be allowed to carry on currying, was therefore refused.

Marblehead, Danvers, Haverhill, and other Essex County towns were early engaged in shoe manufacturing, and by 1788 the town of Reading, in Middlesex County, was a center of shoe production. Boston, Quincy, and other towns in the vicinity largely engaged in shoe manufacture after the Revolution, and before the end of the eighteenth century, Middlesex County possessed seventy tanneries. Two tanneries were in existence in Charlton, in Worcester County, prior to 1793, Capt. Israel Waters, the owner of one of the establishments propelling his "bark mill," operated on a new plan, by water power. A "bark mill," at Medford, at the same period, was operated by the wind.

THE EARLY ADVENTURES IN METAL TRADES

The same year the Lynn Iron Works were established, the story of which is carried in the chapter devoted to the industries of Lynn, the voters of Braintree, granted to John Winthrop, Jr., and his partners, about 3,000 acres of common land, in that town, "for the encouragement of an Iron-work to be set up about Monotcot (Monatiquot) River," but the tract was not surveyed, and laid out, until January, 1648. Previous to the Braintree grant, Thomas Leader, who had been sent from England, by the stockholders of the Lynn enterprise, bought from George Ruggles, twenty acres of land in Braintree, and erected a forge, which apparently was operated by the English company, and which, undoubtedly began business soon after the Lynn works were opened.

Hubbard, one of the historians of the period, makes no mention of the Braintree experiments, but alludes to the Lynn works, and to the fact that good iron, but little inferior to that produced at Bilboa, existed in "Topsfield, seven or eight miles from Ipswich."

As early as October, 1667, the General Court encouraged Joseph Jenks, Sr., to engage in wire-drawing by authorizing the treasurer of the county to appropriate fifteen pounds for the purchase of necessary instruments and tools, and forty shillings for the encouragement of those manufacturing cards and pins from the wire.

From ponds in Middleboro, Attleboro, Carver, Scituate, Halifax, and other towns in Plymouth and Bristol counties, between one and six hundred tons of ore were secured annually, yielding 25 per cent or more of crude iron, which was easily fused, and which, mixed with silicious ores,

produced a fairly good metal for castings. Shells from the seashore provided the flux.

Following the Lynn and Braintree enterprises, James and Henry Leonard established, at Raynham, in 1652, the famous forge,—the first in America to care for the operations incident to a bloomery and forge hammer. For more than eighty years iron was taken from Fowling Pond, adjacent to which sheet of water the enterprise was located, and a few years later, George Leonard set up his extensive iron works in the adjoining town of Norton, using the water power of the Taunton River, and local iron ore.

In 1673, Edward Randolph reported that five iron-works were in operation, and the following year, Nathaniel and Thomas Leonard contracted with John Ruck and others, of Salem, to carry on iron manufacture in Rowley, where water-power, bog ore, and wood were plentiful.

Previous to 1680 iron of good quality was manufactured at Topsfield, and in that year the production of iron was begun at Boxford, the ore being taken from ponds supplying the headwaters of the Rowley and Parker rivers, while a bloomery flourished in the southerly part of Boxford toward the close of the seventeenth century.

An unsuccessful attempt to mine copper was made by Governor Endicott, about 1651, upon land granted him and located between Danvers and Topsfield.

THE CHANGING METHODS OF PRODUCTION

In 1702 Plymouth County's first smelting furnace was set up by Lambert Despard, and others, at Pembroke, then a part of Duxbury, and, in 1739, Joseph Mallinson petitioned the Legislature for 200 acres of unimproved land in order to extend the production of hollow ware, such as pots and kettles made in sand moulds, of which he claimed to be the sole promoter, and which he asserted had saved the Province at least £20,000 annually in importations.

However, the art of casting in sand, in lieu of clay moulds, is ascribed by some of the early historians to Jeremy Florio, who practiced it at Kingston, previous to his death at Plympton, in 1755, at the age of ninety years. At one of the small Kingston furnaces some of the initial experiments in this country in smelting with anthracite coal were carried on early in the nineteenth century.

About 1710 one Mighill erected in the vicinity of Abington and Hanover what later became known as the Drinkwater Iron Works, and in the former town Col. Aaron Hobart, who erected a hot air furnace, cast cannon and shot during the Revolution, while he had turned out church bells there prior to the war. Anchors, cables, bar iron, and hollow ware had been manufactured at Hanover for many years before, and later the first anchors of the *Constitution* were forged there.

About 1722, James and Abiel Packard, Daniel and David Haward, and Constant Southworth, were proprietors of a bloomery forge, at Bridgewater, and fourteen years later Hon. Hugh Orr installed the first trip-hammer in that town, where he began his experiments in the manufacture of scythes, and about 1748 he produced 500 stand of arms for the Province of Massachusetts Bay. Later, he manufactured brass and iron ordnance. His son, Robert, was the originator of a new method of scythe manufacture, and became the first Massachusetts producer of iron shovels. In 1730, Joseph Holmes set up iron works in Plympton, and in that part of the town, now embraced within the limits of Carver, the first cast-iron

tea kettle was made, between 1760 and 1765, this utensil having previously been manufactured from wrought iron.

"Holmes' Iron," taken from Jones River Pond, yielded about 25 per cent iron, and provided material for cannon-shot during the Revolution.

By 1731, nineteen forges or bloomeries for bar-iron, and six producing hollow ware were in operation in the colonies, but exclusive pig iron furnaces and refineries did not appear until sixteen or eighteen years later.

Carver early began the manufacture of iron castings. The famous Federal furnace was erected in 1794, and was more extensive than any that had been built up to that period. The Charlotte furnace, in Middleboro, was erected in 1758, and the first two rolling and slitting mills in the province were established there prior to 1750, there being a third mill in Hanover, and one in Milton, that year.

Wareham, Halifax, Dighton and Weymouth were early engaged in branches of iron manufacture, the Leonards owning a furnace in Wareham, at the beginning of the nineteenth century.

Plymouth and Bristol counties had fourteen blast and six air furnaces, in 1798, twenty forges and seven rolling and slitting mills, and numerous trip-hammers and nail shops. The furnaces produced between 1,500 and 1,800 tons of iron ware, and the forges upwards of 1,000 tons of bar iron annually, and the rolling and slitting mills turned out at least 1,500 tons per annum.

INVENTIONS AND IMPROVEMENTS

About 1790 a furnace was erected in Amesbury, and tools and agricultural implements were manufactured there at that period.

It was at Newburyport that Jacob Perkins, in 1790, first employed his machine for cutting and heading nails, which he patented on January 16, 1795, and which had a capacity of 200,000 nails a day. The machine was operated by water power, and the invention enabled the producers of nails to market them, with profit, for 20 per cent less than the imported English nails.

Previous to 1773, Joseph Washburne, of Braintree, established his furnace on the Ware River, at Furnace Village, in Hardwick, and secured his limestone from a deposit in Ashfield. Before 1793, Mendon, Harvard, Westminster, Northboro and Weston possessed bloomery forges, and Douglas had a refining forge, the ore for the latter enterprise being secured in Uxbridge.

In 1795, Needham and Stoughton possessed iron manufactures, a slitting mill in the latter town cutting and rolling, that year, 1,732 tons of iron.

Steel manufacture began in Canton, in 1787, when Eliphalet Leonard was able to produce the commodity at a lower price than that charged for imported steel, and Dighton had an iron manufacturing concern at that period.

The wire used by the woolen card manufacturers of Boston was produced, at Dedham, about 1790, the invention, by Amos Whittemore, who was granted a patent on his card-making machinery, in 1796, having created a complete revolution in England and America, in this field, by reducing the successive operations of holding and piercing the leather, drawing the wire from the reel, cutting and bending the card tooth, inserting and finally shaping it, to a series of rapid, accurate, and completely automatic machine movements.

Whittemore's invention, coupled with Jacob Perkins' nail machine and

Jesse Reed's tack machine, which was adopted by Thomas Odiorne, of Malden, to cut brads, were regarded in England as possessing uncommon merit, and while employed abroad, their general adoption in this country enabled Massachusetts manufacturers to build up a big foreign trade in cotton and woolen cards, and tacks, nails and brads.

The production of nails, the subject of not less than 120 American patents, between 1790 and 1825, was, on account of its importance, strongly recommended to the people of the colony by the Provincial Assembly, as early as December, 1774, when war had become imminent, and steel, tin plates, firearms, gun and other locks, and wool cards, were also commended as deserving of special attention. Governors Bowdoin and Hancock emphasized to the Legislature that encouragement to the struggling industries should be given, and later Congress was induced to grant extra tariff duties on nails and spikes, with the result that production in this state was doubled within a decade thereafter.

CHAPTER VI

THE BIRTH OF THE TEXTILE INDUSTRY ON THE SOIL OF MASSACHUSETTS

Chronological Record of the Early Textile Enterprises in Massachusetts

1643—The first fulling-mill, built on American soil, erected in Rowley, by John Pearson.

1768—Joshua Upham and his two brothers, residing in Brookfield, and a group of associates, erected in that town, a factory, fifty feet in length and two stories high "for a manufacturing house" and gathered "tradesmen of several sorts for the woolen manufactory," in which they proposed "to keep a large number of looms constantly at work."

1786—Primitive machinery for cotton spinning set up at East Bridgewater.

1788—The Beverly Cotton Manufactory builds its brick mills, at Baker's Corner, in Beverly, and operates its machinery by horse-power, producing corduroys, velvets, thicksetts, and jeans.

1789—Cotton and linen factory erected on Mill River, Worcester, adjacent to Main Street, and the first piece of corduroy taken from the loom on April 30.

1789—President George Washington visits duck manufactory, in Haverhill, owned by Samuel Blodgett. Looms operated by hand-power.

1792—Massachusetts Woolen Manufactory, built by Dr. John Manning, in Ipswich. Factory 105 by 32 feet, two stories high, of wood. First produced flannels and blankets, and then turned to cotton fabrics, operations ceasing in 1800.

1792—Benjamin Shepard erected a cotton factory in Wrentham, installed machines "of the most ingenious construction," and manufactured fustians, cotton-velvets, and other similar fabrics of cotton for men's clothing, coloring his yarns in a dye-house built by him, and weaving the fabrics on hand-looms in a weave shop, which he erected adjoining the main factory, which was 50 by 20 feet, two stories high, with the carding-machine operated by water power, and other machinery operated by horse-power. The original mill was burned in 1893, the fire starting from a kerosene light used for illumination of the plant.

1793—The Newburyport Woolen Manufactory erected on Parker River, in Byfield, 100 by 40 feet, three stories high. Woolen production carried on until 1804, when cotton manufacturing was substituted by John Lees.

1795—Salem had a sail-cloth factory in operation. Probably the fabric was made of linen.

1799—Samuel Slater built a cotton mill, in Rehoboth,—the second enterprise sponsored by him—and in that part of the territory which later was set off to form the Town of Seekonk. From 1800 to 1810 the factory was operated by Samuel Slater & Company. It was of wood, 40 by 26 feet, two stories high, and known as the "White

Mill" because of the color it was painted. Cotton yarns were spun and bed tickings were manufactured there as early as 1802. In 1803, Wilkinson, Greene & Company, the new owners erected another factory there, adjoining the first unit, and as it was constructed of stone it became known as the "Stone Mill." It was equipped with about 2,100 spindles.

1800-10—Sometime during this decade a woolen factory was erected, in Sandwich, where carding and cloth dressing were carried on until 1830, when the plant was torn down.

1801—James Burnham built on a privilege on Bass River, in Beverly, that town's second cotton mill, a wooden factory, 50 by 30, two stories high, in which operations began in 1802. When he disposed of it in 1803 it was equipped with 648 spindles. Here, according to Joshua Herrick, who was alive in 1863, his father employed some of the best weavers to make bed-ticking, shirtings, sheeting, and table-cloths, and this production apparently was carried on prior to the close of the War of 1812.

1801—The Milk Row Bleachery & Dyeing Company was established in what was then a part of Charlestown, now included in the territory of the City of Somerville, the concern taking its name from the street in front of its pioneer plant, then known as Milk Row, which derived this odd designation because of the fact that it was over this highway that the farmers brought their milk to Boston, and it was past here, too, that the British troops marched on their way to Concord and Lexington, in 1775. In 1819, the plant was incorporated as the Charlestown Bleachery, and when Somerville was set off from Charlestown, in 1842, the name of the concern was changed to the Somerville Bleaching, Dyeing & Calendering Company, and a few years later to the Middlesex Bleachery & Dye Works. The story of this concern appears in the chapter devoted to the industries of Somerville.

1801—Moses Hale set up in that part of Chelmsford, which now lies within the territorial limits of Lowell, the first carding mill operated by power, in the United States.

1803—Seth Bemis installed machinery for carding and spinning cotton and for making cotton warps, at his Watertown mill, which he had purchased in 1796, and early in 1807 installed hand looms to manufacture sheetings, shirtings and bed-tickings, adding sail-cloth, or duck, previously manufactured only from linen or flax-yarn, but which he produced from cotton on specially constructed hand-looms, operated by six English weavers. In 1812 and 1813 he sold $20,000 worth of duck, in Baltimore.

1803—Abraham Marland, who became a prominent manufacturer in Andover, removed from Beverly to Lynnfield, where he built that year a small mill and began the manufacture of cotton yarns for knitting and weaving, going from there to Andover four years later.

1803—James Beaumont, and others built a cotton factory, on the Neponset River, in Canton, which was equipped with machinery built by him and others, and began producing wick yarn for candles, turning out in 1803, according to his statement, the first piece of "domestick cloth" for sheeting "ever made in America from mule yarn, either all or in part," followed by shirtings, which he claimed to have sold from 35 to 42 cents per yard.

1804—Ezekiel Hale established a factory, in Haverhill, which continued cotton manufacturing operations until 1833, when it became a woolen mill. It was the germ of the present extensive woolen mills located on the same site now owned by M. T. Stevens & Sons Co., of North Andover.

1804—Arthur Scholfield turned out, at Pittsfield, the first yard of fine broadcloth, manufactured on machines of his own invention and make.

1805—Luther Metcalf and others erected a factory, 60 by 30 feet, two stories high, in Medway, which began operations in March, 1807, with 880 spindles, for carding and spinning operations, and the manufacture of cotton goods. In 1809 the concern was incorporated as the Medway Cotton Manufactory, with authorized capital of $150,000. Burned in 1811, a new factory was immediately rebuilt, which was torn down in 1881, when a brick mill, 106 by 55 feet, three stories high, was erected on the site. This plant was bought in 1910 by the Fabyan Co., of Stafford Springs, Conn., which concern enlarged the mills, and now operates them under the name of the Fabyan Woolen Co.

1805—Ebenezer Tyler, II, and others, built on the Blackstone River, in Rehoboth, a wooden factory, painted yellow, which early took the name of "Yellow Mill" to distinguish it from Samuel Slater's "White Mill," located on the same side of the river, and Almy, Brown & Slater's "Green Mill," situated on the opposite bank. Successful from the start, a second factory, built of stone, was erected, in 1813, by the Pawtucket Cotton and Oil Mfg. Co., which name the incorporators adopted, in 1805. The two units housed 3,300 spindles, in 1815. In addition to cotton yarns, some type of cotton fabrics was produced there.

1805—Jeduthun Fuller, and others, erected on the Charles River, in Watertown, a mill in which cotton yarn was spun, and installed a waterwheel of sufficient size to operate 500 spindles. In 1810 the concern was known as Wiswall, Fuller & Co., and at that time the factory was 54 by 32 feet, four stories high, of wooden construction. Four years later it had capital of $45,000, and in 1815 was incorporated as the Watertown Cotton Factory Co., with authorized capital of $150,000.

1806—The mills of the Dighton Manufacturing Co. were erected on Three Mile River, at Dighton Upper Four Corners, for the manufacture of cotton goods, followed a few years later by the building of a foundry and machine shop where cotton-spinning and cotton-weaving machinery was manufactured.

1806—Silas Shepard, and others, erected in Taunton, a factory which for years was known as the "Green Mill," but which was operated as the Taunton Cotton Mill. Here spinning was carried on for twelve years, power-looms of the Gilmour pattern being installed, in 1818, when the production of checks, ginghams, and ticking, was commenced.

1806—Nathaniel and Dexter Wheeler, Oliver Chace and others, built on Lee's River, in Swansea, a cotton factory which may be said to have been the forerunner of the great cotton industries of Fall River, since the largest subscriber to the original stock of the Fall River Manufactory and the two principal promoters of the Troy Cotton and Woolen Manufactory, were the original holders of three-fourths

of the equity in the Swansea enterprise. The mill was incorporated in 1814 as the Swansea Cotton Mfg. Co., and was burned in 1838, and never rebuilt.

1807—Edward Kimball, Jr., built a dam and a brick cotton mill, 60 by 30 feet, on the north branch of the Nashua River, in Fitchburg, and induced Charles Robbins, of New Ipswich, N. H., who had erected the first cotton factory in that town, to remove to Fitchburg and make the patterns for the machinery for the Kimball Mill.

1807—The Fitchburg Cotton Manufacturing Corporation was chartered, in Fitchburg, with capital of $150,000 and erected a three-story mill, with basement, 50 by 30 feet, which, in 1817, was turned into a woolen factory. In 1886 this original mill became the property of the Parkhill Mfg. Co.

1807—A factory was erected on the site of the present plant of the Whittenton Mfg. Co., in Taunton, for the spinning of cotton, and was destroyed by fire four years later, but immediately a new building, 70 by 30 feet, three stories high, was built, with an attic in which the mules were installed. By the close of the War of 1812 it was known as the Whittenton Mill, and was equipped with 800 spindles. Power looms were installed in 1818, and five years later the plant was sold to the Taunton Mfg. Co. For a century and a quarter cotton manufacturing of some kind has been carried on there without interruption to the present time—a record approached by but few textile units in the state.

1807—The Norfolk Cotton Manufactory was incorporated with $120,000 capital, and built a factory on the upper dam of Mother Brook, in Dedham, "to manufacture cotton in its various branches." Cotton yarns were spun at first, followed by the production of cloth on handlooms, and in 1812 woolen fabrics and satinets were manufactured in the plant.

1808—A cotton factory was established at Douglas.

1808—James Beaumont built his second cotton factory, in Canton, and began the manufacture of satinet and pelisse wadding.

1808—Seth Wheaton erected in Mendon, what at that period was one of the largest, if not actually the most extensive factory, for the spinning of yarn, that had been built up to that year—a stone mill, 211 by 40 feet, six stories high, with a capacity of 10,000 spindles, and which was known as the Blackstone Manufacturing Co. It began operations in November, 1809, with 5,000 spindles—a larger number than was operated at that time by any concern in the country save two—Almy, Brown & Slater, at Slatersville, R. I., and the Union Mfg. Co., of Maryland.

1808—Ephraim Hartwell and John Brown, as partners, built a cotton factory, three stories high, 100 by 30 feet, at Watertown, which later was operated as Hartwell, Brown & Co.

1809—The Rehoboth Union Cotton Mfg. Co. erected, in Rehoboth, a small mill, equipped with 360 spindles, where the production of cotton yarn was commenced, and after being dyed it was sold to handweavers, to be converted into cloth. Not until 1898 was the plant demolished.

1809—In the village of Unionville, in Holden, Eleazer Rider & Son began to spin cotton yarn, and, in 1822, power looms were installed and the manufacture of cotton cloth was commenced.

1809—David Poignand and Samuel Plant, purchased tracts of land and water rights on August 18, 1809, and signed a contract on May 1, 1810, for the erection, on Water Street, in Clinton, then a part of Lancaster, (Clinton not being incorporated as a town until 1850) of a brick mill, 57 by 38½ feet, three stories in height, and this original structure, with many additions made in the intervening years, still stands. Here cotton cloth and ginghams were manufactured, under one roof and by the factory system, with power machinery, by Poignand & Plant, as early as 1813, according to records of sales and samples of the goods, which have been preserved. Other factories, and other individuals and firms had produced finished cloths without the factory system, or with only a partial development of it, but it seems beyond dispute that here was probably the first building in the world in which cotton sheetings and ginghams were entirely made under that system. Between 1812 and 1814 the names of 28 women and six men and boys were carried on the payrolls that have been preserved, and as early as 1813 a woman's boarding house, with 12 beds, was established. When the senior partner's daughter was married on February 13, 1814, she wore a wedding gown fashioned of cloth woven in her father's mill. The brick mill was originally equipped with 896 spindles.

1809—Paul Whitin, of Whitinsville, in the Town of Northbridge, turned his scythe and hoe manufactory, in the village, into a cotton mill—the third unit of its kind in the Blackstone Valley, north of Pawtucket, R. I.,—and carried on cotton production there until 1864, under the name of Paul Whitin & Sons. Today, the concern is The Paul Whitin Mfg. Co., and it still remains in the control of the direct descendants of the founder.

1809—A clipping, preserved in a scrapbook in the possession of the Sharon Public Library, states that the mill of the Sharon Cotton Manufacturing Co. was built in Sharon, that year, by Darius and Gilbert Lothrop, mason and carpenter, respectively, while still another clipping in the same institution gives 1811 as the date of the founding of the first local cotton factory. James Beaumont, the Canton textile operator, fixes the date of the starting of the Lothrop enterprise, as 1813, an assertion that seems to be within the bounds of reason.

1809—Ebenezer Tyler, and others, erected on Ten Mile River, in Attleboro, a cotton spinning mill of 1,000 spindle capacity. By 1815, it had 1,400 spindles and was the largest of nine local cotton plants then in operation, in that town.

1809—Eleazer Rider & Sons built a factory, and engaged in spinning cotton yarns, in the Village of Unionville, in Holden, adding power looms in 1822, when the firm began the manufacture of cotton cloth.

1810—Dr. Nathaniel Miller, a graduate of Bowdoin College, and of the Harvard Medical School, was at the head of a group which erected at North Bellingham, that year, a cotton factory, the original mill being constructed by Joseph Ray, of Blackstone, who had built many other factories in the Blackstone Valley, and who was a member of the firm of Paine & Ray, which at that period was engaged in the manufacture of cotton mill machinery. The North Bellingham factory was burned in 1838, but was rebuilt.

1810—As early as this year the Gov. Christopher Gore fulling mill was in operation, as a cotton and woolen factory, in Waltham, and on October 12, 1812, the Waltham Cotton and Wool Factory Company was

incorporated, and took over the Gore plant, using it for finishing bleached goods. Starbuck, the Waltham historian, says: "A large four-story wooden building for the manufacture of cotton cloth was built, in 1810, and operations were begun in the same year." The plant included "a large store and warehouse, dye-house, grist-mill, mechanics' shop, woolen factory, weavers' and schoolhouse," and more than 200 operatives were employed, a goodly proportion being women and children.

1810—Benjamin Shepard, Jr., removed to Middleboro, from Wrentham, in 1810, where, with his father, and brother Oliver, he purchased a mill privilege, and erected a cotton factory, to carry on the manufacture of yarns. Oliver Shepard remained there and, in 1810, installed machinery especially adapted to the manufacture of counterpanes, which he continued to produce until his death, in 1814. Benjamin Shepard, Jr., then returned to Wrentham, and the mill was operated under the firm name of Benjamin Shepard & Son, until 1837.

1810—Daniel Day erected a two-story factory, 20 by 40 feet, on the water power privilege now occupied by S. F. Scott & Sons, at Elmdale, in Uxbridge, and began the manufacture of woolens.

1810—Benjamin Clapp erected a mill in the village later known as Rogersonville, in North Uxbridge, and on the Mumford River, where he produced the first cotton goods ever manufactured in Uxbridge.

1810—Capt. Azel Ames, and his brother, Elijah, settled in Mansfield, formed the Mansfield Cotton & Woolen Co., and erected a mill where the Chandler factory stood later, and on the same dam privilege. The enterprise became the life and center of local affairs, and continued in operation until 1866.

1810—According to Daniel T. V. Huntoon, the Canton historian, Crane & Wilde, who, in 1809, bought the first factory, built by James Beaumont, in that town, installed the first power loom in their plant, in 1810. It was so complicated that six days were required to set it up, and at the end of 15 days it was given up as worthless. Huntoon writes that the next power looms were built by Crehore, of Milton, and placed in operation at Crane & Wilde's Steep Brook factory, being "among the first in the state that made good cotton cloth."

1810—The Palmer's River Mfg. Co. erected a cotton mill, in Rehoboth, and when the original structure was burned in 1831, a new factory was built, which was operated until 1884, when it, too, was destroyed by fire.

1810—John B. Root and Richard S. Chappell formed the firm of Root & Chappell and erected a wooden mill, 75 by 35 feet, four stories high, with a basement, on the bank of the Housatonic River, in Pittsfield, for the manufacture of cotton and woolen fabrics, the concern taking the name of the Housatonic Woolen Factory, later that year, but became incorporated in 1812 as the Housatonic Manufacturing Co. When the plant was offered for sale at auction, in 1816, it had 240 cotton spindles and 140 woolen spindles.

1811—Samuel Valentine, Jr., and others bought the fulling mill property, owned by Samuel Clark, on January 23, and located a factory on the falls on the Hopkinton River, where the Town of Ashland is now situated, and began the spinning of cotton yarn.

1811—Hopestill Leland, and Col. Calvin Sanger, both of Sherborn, and others, purchased a water privilege on Cochituate Brook, in the Village of Saxonville, Framingham, and erected a cotton mill which, on

February 6, 1813, was bought by the Framingham Manufacturing Co, with capital of $80,000 and incorporated to manufacture cotton and wool. Large additions to the land holdings were made the next year, and the concern gathered a considerable number of families, having children old enough to work in the plant, and also opened a company store. The factory was burned in 1834.

1811—Cotton spinning by power and the manufacture of cotton cloth on hand looms was begun, at Factory Village, in Ashburnham, by Samuel Dunster and Roger Chandler, and continued until the plant was destroyed by fire, in 1846.

1811—Richard Olney purchased land on the bank of the Mumford River, in East Douglas, organized the firm of Richard Olney & Co., and built a cotton spinning mill, which later became the Douglas Cotton Mfg. Co. In 1817, Mr. Olney erected another cotton mill, in Douglas.

1811—Francis Faulkner began the manufacture of woolen goods, in North Billerica, and for a century the firm carried on a successful business, selling its assets to the North Billerica Co. in 1914, which concern operates the Faulkner Mills today.

1811—In September, 1810, the inhabitants of the Town of Sharon gave permission to Joseph Hewins, to build a dam in the road near the residence of Samuel Hewins, and the following year he built the first cotton factory erected in that town.

1811—In 1811 the Sturbridge Manufacturing Co. acquired the grist mill owned by Moses Fisk, in the Village of Westville, in Sturbridge, and built the first cotton mill erected in that section of Worcester County, installing 128 spindles, and selling the business to the Westville Mfg. Co. in 1833.

1811—Col. Joseph Durfee organized the Globe Mill, and erected a small one-story factory, in the Village of Fall River, in the Town of Troy, to produce cotton yarn. When the mill was burned several years later, a new factory was erected on the site, and from 1829 to 1839 the plant was operated as a print mill, being known from 1835 to 1839 as the Riverton Print Works, and after many vicissitudes the mill passed to The Globe Yarn Co., and later to the Laurel Lake Mills because of the water power privileges.

1811—The Dorchester Cotton and Iron Co. was incorporated July 4, purchased a water privilege of Jeremiah Smith Boies, and began the manufacture of cotton cloth, but beyond carding and spinning, it is apparent that the other operations were carried on in the homes.

1812—The Jones River Cotton Mfg. Co. was established at Kingston.

1812—The Dean Cotton Mill was erected at Barehole Neck, in Taunton, the factory being 50 feet long, and two stories in height, and the manufacture of cotton yarns was carried on there until about 1820 when 20 Slater power looms were installed.

1812—The Dudley Mill Co. was formed and a mill built, in Dudley, as the result of the embargo of 1809 and of subsequent events, where operations were carried on until 1846, when H. H. Stevens purchased the property, and incorporated the Stevens Linen Co., which is still in operation.

1812—Samuel Wing, and others, were granted permission by the inhabitants of the Town of Sandwich, in 1811, to erect a dam and to build a cotton factory, between the upper and lower ponds, in Sandwich Village, and the plant was constructed and placed in operation the

following year. It continued to house various kinds of manufacturing enterprises until it was burned, in 1883.

1812—Samuel Slater and Bela Tiffany formed the firm of Slater & Tiffany, purchased a large tract of land, acquired control of the water privilege located at Oxford South Gore, which later became a part of the Town of Webster, and erected a cotton factory, which formed the nucleus of the present extensive industrial development, at East Webster, and became the predecessor of S. Slater & Sons, Inc.

1812—The Middlesex Mfg. Co. was formed in 1812, at Framingham, to manufacture cotton goods.

1813—The Bellingham Cotton and Woolen Mfg. Co., with capital of $15,000, erected a stone cotton mill, on the Charles River, at North Bellingham, which was burned in 1828, but at once rebuilt.

1813—A wooden cotton factory was built, at a cost of $3,000, in Chelmsford, by Capt. Phineas Whiting and Maj. Josiah Fletcher, on the site where the Middlesex Mills were later erected. In 1818 it was converted into a woolen factory.

1813—A cotton factory was established in Plympton.

1813—A cotton mill was erected in Enfield.

1813—The Franklin Manufacturing Co. was established at Franklin, to manufacture cotton goods.

1813—The Royalston Cotton & Wool Mfg. Co. erected a cotton factory at South Royalston, which was destroyed by fire twenty years later.

1813—The Troy Manufacturing Company, later called the Troy Cotton and Woolen Manufactory, was promoted by Oliver Chase, and began with capital of $50,000, the original plant being equipped with 2,000 spindles. Operating night and day from 1820 to 1824, and in the latter year the first dividend of $25 a share was declared, and another for the same amount was paid three months later. The concern is operated today under the old name of Troy Cotton and Woolen Manufactory, has capital of $300,000, and now employs 400 operatives in the production of print and book cloths, converters goods, gauzes, netting, and tobacco cloth. The plant has 50,994 ring spindles, 870 looms, 75 cards, four boilers, and a water wheel.

1813—The Fall River Manufactory was established, with $40,000 capital, and David Anthony, who headed the corporation, installed 1,500 spindles upon the completion of the factory. It produced spun yarn, which was woven into cotton fabrics on hand looms by housewives in the vicinity. Power looms were installed in 1817, and four years later fancy stripes were woven there. About that period the plant had 30 looms, and 31 workers were employed, and in 1827 an addition was built to the original mill. The concern was subsequently absorbed by the Pocasset Mfg. Co.

1813—The Union Cotton Factory was started in a small building, on the site of the present Laurel Lake Mills, in what was then the Village of Tiverton, and was the fourth cotton plant established in Fall River. The mill was burned in 1838.

1814—Warren P. King, Isaac Johnson, and others, built a mill in the Village of Shattuckville, in the Town of Colrain, and began the manufacture of cotton fabrics. This seems to have been the first cotton textile enterprise started in Franklin County. The plant was the nucleus of what later became known as the Shattuck Mill, which was owned by Messrs. Canedy & Field, in the '90s of the last century.

1814—A brick cotton factory, 75 by 32 feet, three stories high, typical of the mill architecture of that period, was erected at Adams, the power being supplied by the rapids of the Hoosac River, and the plant being built on the site of an ancient iron works. Its original name was the Adams South Village Cotton and Woolen Mfg. Co., and it was equipped at the outset with 708 spindles and 26 looms. One of the 31 stockholders later became an uncle, by marriage, of Gen. William C. Plunkett, who came to Adams at his uncle's solicitation, in 1829, to help manage the plant, which was the nucleus of the present-day W. C. Plunkett & Sons Co., of Adams, and of all the pioneer cotton enterprises it with the Paul Whitin Mfg. Co., of Northbridge, constitute the two cotton textile units in Massachusetts where continuous operations have been extended over a period of 116 years and 121 years, respectively, without interruption, and by four successive generations of a single family, whose representatives have been active in its management and ownership for periods of 101 years and 121 years, respectively.

1814—The Pittsfield Woolen and Cotton Factory was incorporated by the Legislature, with capital of $130,000.

1814—Messrs. Penniman, Scammell & Co., purchased in 1812, for $1,200, land on both sides of the turnpike from Mendon to Boston, and on both banks of the Charles River, "for a manufactory now building," together with the right of flowage, and in 1814 incorporated the Bellingham Woolen and Cotton Manufacturing Co., and erected a factory in the Village of South Milford. The mill was burned in 1868.

1814—Dexter Ballou began to spin cotton, in Fall River, in a factory which later became known as the Lyman Mill.

1814—The Northboro Mfg. Co. erected a factory, at Northboro, which cost $30,000, and which turned out 387,000 yards of cotton cloth yearly. It survived until 1860 when the plant was burned.

1814—The Rivulet Mill was built at Uxbridge, on the site of the present factory that bears that name, and here the second local attempt to manufacture woolens was made.

1814—Francis Cabot Lowell, and his brother-in-law, Patrick Tracy Jackson, formed the Waltham Company on February 28, 1813, purchased water rights on the Charles, in Waltham, and in the fall of 1814 completed and installed the first power-loom built by Messrs. Lowell and Paul Moody, and began the manufacture of heavy sheetings. From its inception to date, with only the change in corporate name to the Boston Manufacturing Co., the concern has continuously operated, and it stands today with some 116 years of service behind it as one of the three oldest concerns of its kind in America.

1814—The Wellington Cotton Co. was organized in Dighton, with $90,000 capital and was operated under various owners until 1845, when the factory was burned.

1814—Oliver Ames, a native of Bridgewater, began the manufacture of cotton goods, in Easton, and later produced cotton machinery.

1814—The Mansfield North Cotton Mfg. Co. was formed in Mansfield.

1814—The West Boylston Mfg. Co. was incorporated February 3, to manufacture cotton and woolen goods, and fine wire and built a factory in White's Village, in the Town of West Boylston, remaining there until the building of the Wachusett Reservoir in 1900, when the property was acquired for the Metropolitan water supply, and the

corporation removed to Easthampton, where it operates today, and employs 1,700 operatives.

1815-16—The Messrs. Gleason erected a sixty-spindle mill, in Monroe, after the War of 1812, and manufactured satinets.

1815—William Arnold and others built the Ironstone Mill, on Ironstone Brook, in Uxbridge, and engaged in the manufacture of cotton goods.

THE BEGINNINGS OF THE INDUSTRIAL REVOLUTION

It matters little whether one denominates the period which began early in the eighteenth century, and which still continues and is likely to continue for many decades to come, as the mechanical or the scientific age, or as the industrial revolution. The one salient and obvious fact that stands out above all others is that this extraordinary phase of modern civilization, which has so completely revolutionized the social and economic life of the world, has been, until within recent decades, almost completely neglected.

The writer of this work has been amazed in searching the pages of town, city, county, state, and national histories, and in studying biographies, magazines, and published works of all kinds, to note the paucity of data covering the rise, growth, and development of the industrial agencies that have exerted such a profound and dominating influence upon the every-day lives of countless millions of people, and particularly the details in connection with the birth of the American textile industry.

Pseudo historians, blindly adhering to the old traditions, have devoted their research and conclusions primarily to military, naval, political, religious and social events, and have paid scant or no attention to the industrial structure of the towns, cities, states, and nation upon which all material and social progress is predicated, and which was constantly undergoing almost kaleidoscopic and fundamental changes during each succeeding generation.

Lord Macaulay never penned a more effective truism than when he wrote in his essay on Machiavelli: "Historians rarely descend to those details from which alone the real state of a community can be collected. Hence posterity is too often deceived by the vague hyperboles of poets and rhetoricians, who mistake the splendor of a court for the happiness of a people."

While there existed some justification for this treatment of history by those who attempted to chronicle the events of the Middle Ages and very early modern times, when devastating wars, changing boundaries of nations, the abdication of kings and the advent of plagues and famines, constituted the general order of events the fact remains that the American historian who neglected to portray the industrial and commercial progress of a small community or of a nation with the same fidelity that he demonstrated in recording its religious, military and social contributions, was derelict in his duty.

This is particularly true of those who within the last century and a quarter have attempted to record in history's pages the development of towns, cities and commonwealths.

It may be said in extenuation of those who preceded this period that the unchanging condition of the economic life of the world before the invention of the steam engine was mainly responsible for the unsatisfactory and incomplete treatment of history. Justin McCarthy, in his "History of Our Own Times," emphasizes that when Robert Peel, then serving as Ambassador to Rome, was appointed Prime Minister by Queen Victoria,

in 1834, he traveled from the Eternal City to London by precisely the same means that Constantine had employed in journeying from York to Rome when elected emperor, by his soldiers, in 306. In other words, both had the benefit of all that sails and horses could furnish. Considering the means of transportation in vogue they covered the distance in exceptionally fast time. Had Peel's trip taken place after the dawn of the steam engine he could have made the journey in a fraction of the time by train and channel packet boat.

The industrial revolution takes its place as one of the most important factors since the dawn of civilization, because it has very vitally affected all who are now living, and countless millions who lived during the eighteenth and nineteenth centuries.

A very proper inquiry is why did it occur when it did? What was the reason for the western world, after employing for thousands of years a technique developed originally by the Assyrians and Egyptians, suddenly changing the entire standard of existence in the comparatively short period of two or three hundred years?

One need not search far nor long for the answer. The accursed policy of slavery was the chief deterrent in the ancient world, even as it was in the southern part of our own country until comparatively recent times. Had it not been for this evil thing, the industrial revolution might have begun in the ancient or medieval eras. Search the list of world inventors, and with a comparatively few notable exceptions, it will be observed that as a general rule improvements along mechanical and scientific lines have been made by those skilled in the art to which the invention relates, and it is perfectly obvious that where practically all of the labor is done by slaves, there exists no chance for industrial or other development, since a slave can scarcely create an important invention.

Dependent on others for his very existence, with absolutely no command of his time, and without any objective in increasing production, it is easily seen that invention could not come from that source.

Coupled with slavery came the confusion following the fall of the Roman Empire, and the casting of society in the mold of feudalism—these factors furnishing added reasons for the failure of the world to find itself and to progress. Following the Crusades, the Renaissance, the outstanding scientific discoveries of the sixteenth and seventeenth centuries, and the discovery and settlement of America with the wealth that event afforded Europe, the elements conducive to an industrial revolution were set in motion.

That it should have had its beginnings in England is but the natural sequence, because that country, owing to its insular position, was the one outstanding nation of the world which, for a long period of time, had been free from invasion. Having made progress in the accumulation of wealth and having fostered manufactures she found her geographical position most fortunate following the discovery of America. By persistent effort and legislation, by the enterprise of her people, continued for several centuries, England had mastered the art of weaving and finishing woolen fabrics, and by the beginning of the eighteenth century she was in position to export many of these commodities.

But by one of those peculiar whirligigs of time her production of woolen cloth was not destined to be the industry that was to become the sponsor of the mechanical era. On the contrary, a new industry—the manufacture of cotton—was to usher in the industrial revolution, and once the stage was set, it was to begin with an improvement in weaving.

THE RISE OF TEXTILE MANUFACTURES IN AMERICA

It was but natural that the inception of the textile industries should be the first consideration of the colonists after provision had been made for the mouths of our forebears. Next to food, nothing was so important as clothing and staples for the households.

The story of the textile industries of Massachusetts is as romantic and entrancing as an eastern fairy tale. It is the epic of men who aroused the genii of machinery and compelled him to do the bidding of man.

It is as human as O. Henry's stories, and as abounding in courage as was David of old.

It savors of patient perseverance, of self-denial, even of privations, and of overcoming almost insuperable obstacles. Even as early as the Revolution and the War of 1812 it served the colonists and the young Republic in two great internal crises, and it was here on the soil of Massachusetts that the American textile industry was born.

It then and there gave notice to the mother country that industrial independence was a corollary of political independence.

The shelves of libraries, public and private, fairly groan with the weight of books that record the advent and the passing of kings, generals, and statesmen, but one finds a negligible number of works descriptive of the invincible courage, the grim determination and the lasting achievements of the captains of the early textile industry who wrought for the welfare of mankind, and of the colossal contributions they made to the prosperity of the commonwealth and the nation, through their inventive genius and their executive ability.

The telling of the story carries with it no heroics or deeds of valor such as are recorded of those who gave their lives on the battlefields; no lurid flame such as attends the havoc of war, but rather the light on its pages is that reflected from almost countless primitive lamps, whose rays illumined the pioneer factories; the rythm is not produced by marching military hosts, but rather is that of the hesitating and halting spindles and looms of the early days of cotton, woolen and linen productions; and the printed words a summation of the intricate parts of uncanny machines, into which the inventors of them seem to have thrown their very selves, so human are their delicate movements in operation, in this day and generation.

The contributions of these benefactors of mankind caused the waste places to bloom; they increased the harvest a thousand-fold, and they filled the commonwealth from Cape Cod to the Berkshires with the homes of contented artisans.

THE EXPERIMENT AT ROWLEY IN 1643

In Edward Johnson's "Wonder-Working Providences of Sion's Saviour in New England," published in London, in 1654, referring to the year 1638, the author says:

"At this time, the Lord brought over the zealous-affected and judicious servant of His, Master Ezekiel Rogers, who, with an holy and humble people, made his progress to the northeastward, and erected a town about six miles from Ipswich, called Rowley. These people, being very industrious every way, soone built many houses to the number of about threescore families, and were the first people that set upon making cloth in this western world; for which end they built a fulling-mill, and cause their little ones to be very diligent in spinning cotton-woole, many of them

having been clothiers in England till their zeale to promote the gospel of Christ caused them to wander."

Rev. Ezekiel Rogers and those accompanying him, arrived in Boston, late in 1638, where they remained until the following April, when they established their new settlement, and began the manufacture of woolen cloth, laboring together in a community of interest for approximately five years before a division of land was made. The fulling mill was erected in 1643 by John Pearson, who was not one of the original colony, but who went to Rowley from Lynn.

There seems to be no doubt that it was the first unit of its kind erected in this country, and was built in the northerly part of Rowley, on what is now known as Mill River, just above tide-water, near the point where the Newburyport turnpike crosses the stream, and in the immediate vicinity of where the first grist mill was located, and where factories for various purposes have since existed.

The earlier products manufactured at Rowley, at Boston, and other settlements were largely composed of linen and woolen, as it was difficult, with the hand-spinning wheels of the period, to spin cotton yarn of sufficient strength for warps. Consequently, linen was commonly used for the warps, even of cloth that was referred to by the historians of the time as being of a cotton nature. As a matter of fact the fabrics were of linen fibre. All of the early enactments of the General Court refer to linen, while the growing of hemp and flax was encouraged by legislative fiat. As early as 1642 Johnson stated that there were 1,000 sheep available in the vicinity of Boston, for a supply of wool and even as late as 1748, when the Linen Manufactory House was established there, and when five years later "The Manufactory House" was created and owned by the General Court, it was the production of linen that was stressed and carried on until the time of the Revolution.

According to the Boston *News Letter*, of October 6, 1768, Joshua Upham, and his two brothers, residing in Brookfield, with a group of associates, erected a factory fifty feet in length and two stories high, "for a manufacturing house," and gathered "tradesmen of several sorts for the woolen manufactory," in which they proposed "to keep a large number of looms constantly at work."

It is regrettable that no additional data seems to be at hand to tell the full story of this pioneer textile enterprise, for it is evident that it was of considerable importance.

The primitive weaving operations carried on by William Howe, at Chelmsford, beginning in 1656; the fulling mills set up at Watertown, in 1662 and 1681, and at Dedham, in 1681; the legislative encouragement given to linen and cordage production, as carried on at Salem and Boston, during the early years of the colonial period; the advent of workers in wool, and the initial Boston experiments in linen, hat, silk, worsted, and cotton sail duck manufacture, are treated at length in Chapter IV of this work.

THE WALTHAM CLAIM TO PRIORITY

For generations the claim has been made that the first cotton factory in Massachusetts, operated by power machinery was that erected at Waltham, by the Boston Manufacturing Company, in 1814, and that it was "the first in the world that combined all the processes necessary for converting the raw cotton into finished cloth." In the "History of Waltham" the statement is carried: "The first record of it (Boston Manu-

acturing Co.) is on the books of this company under date of February 2, 1816, at which time the entry was made of one thousand two hundred and forty-two yards, 4-4, or thirty-six inches wide cotton. There is no doubt that this entry records the date of the first manufacture of cotton cloth in America, where all operations were performed under one roof."

Hon. Carroll D. Wright and Horace G. Wadlin, who contributed the chapter on "The Industries of the Last Hundred Years" to the "Memorial History of Boston," are authority for the statement that "Mr. Lowell's loom was put in operation, in Waltham, in 1814," and Charles A. Nelson, in his work entitled, "Waltham—Past and Present," published in 1879, asserts that "in the autumn of 1814 a power loom was put into successful operation," at the plant.

It seems to be definitely established by evidence that cannot be controverted that several earlier successful attempts to manufacture cotton fabrics by machinery, driven by power, and where all operations were conducted in a single factory, had been made on the soil of Massachusetts, prior to the Waltham experiment.

The author frankly confesses his inability, due to the meager records thus far unearthed, to make a positive assertion that he has actually discovered as the result of his research, the full story with respect to all the earlier Massachusetts ventures in the field of cotton and woolen production by power. But even with the incomplete data it seems certain that textile fabrics had been produced in Massachusetts where all the operations were carried on by power, under one roof, and by the so-called factory system, some years before the Waltham enterprise was conceived.

COTTON MACHINERY FOR SPINNING SET UP AT EAST BRIDGEWATER IN 1786

In 1786, some primitive machinery for cotton spinning was set up at East Bridgewater, but there is no evidence that weaving operations were carried on there, at that period, either by hand or water-power.

THE BEVERLY COTTON MILL

Coincident with the activities of Hon. Hugh Orr, of Bridgewater, upon whose head fell the reproaches of the unthinking, who charged him with a desire to supersede honest manual labor by the introduction of machinery, a corporation was formed at Beverly, in the fall of 1787, to manufacture cotton, and of which John Cabot and Joshua Fisher were the principal sponsors. It is frequently referred to by historians as the first of its kind in New England, and the second in the United States.

On February 15, 1787, Thomas Somers, an Englishman, and an expert in cotton manufacture, addressed a petition to the Legislature, in which he set forth that while en route from Baltimore to Boston, in a sloop, he had the misfortune to lose practically one-half of the property upon which he hoped to subsist until he could engage in business, and requesting assistance to enable him to capitalize his textile experience, the General Court granted him twenty pounds to encourage his manufacture of cotton goods.

In all probability it was the Somers episode that led John, George and Andrew Cabot, Joshua Fisher, Moses Brown, Israel Thorndike, Isaac Chapman, and Deborah Cabot, all of Beverly, and Henry Higginson, of Boston, to invest their capital in the factory there, which was located in the northerly part of the town, at what was known early in the last century, as Baker's Corner.

Land was purchased on August 18, 1788. Work on the mill was at

once commenced, and before January 6, 1789, it was completed. It was a plain three-story building of brick, measuring about sixty by twenty-five feet, with a pitching shingle roof, and a deep basement, in a part of which moved a heavy pair of horses to furnish rotary power. The number of employees is given as forty, thirty-nine of whom were natives. The actual expenditure on the enterprise was about $14,000.

THE PRIMITIVE EQUIPMENT OF THE FACTORY

On January 15, 1789, the promoters petitioned the Legislature for a charter, and presented an account showing that the land and factory represented an investment of 850 pounds; that a carding machine cost 284 pounds; that four jennies cost respectively 93 pounds, 13 pounds, 10 shillings and the other two, 15 pounds each; that eleven looms, of which the first cost 13 pounds, 10 shillings, and the other ten 30 pounds each and that sundry small machines for winding cost 18 pounds. It was estimated that twenty pounds would be needed to pay for a new covering of the carding machine, and that the subsistence of two European artists and their families for fourteen months, including the expense of their removal to Beverly, amounted to 220 pounds, while the cost of 1,764 pounds of cotton used in making cloth, or wasted in experiments, amounted to 176 pounds, 8 shillings. A thousand skeins of linen yarn cost the promoters 30 pounds, 4 shillings, and two pence, and they paid for labor on 1,200 yards of corduroy, then fit for cutting, the sum of 120 pounds.

On February 3, the Legislature granted a charter to The Proprietors of the Beverly Cotton Manufactory, with authorized real estate capital of 10,000 pounds, and 80,000 pounds personal property, and on the seventeenth day of that month, loaned the incorporators the equivalent of 500 pounds, "in Eastern lands" and further enacted that all goods of the corporation should have a label of lead affixed to one end, which must bear an impression of the corporate seal, thus showing conclusively that the first cotton mill in New England was wise enough to trade-mark its goods. It also advertised them for sale in Salem and Beverly under its trade-mark.

One or more spinning jennies, either imported or made from the state's models by Hugh Orr, and probably designed on the lines of the jennies made by the Messrs. Barr, were ultimately obtained, and the carding machine was imported from England.

The Salem *Mercury*, of April 22, 1788, says: "Several public-spirited gentlemen have procured a complete set of machines for carding and spinning cotton, with which an experiment was made a few days ago, answering the warmest wishes of the proprietors. The jenny spun sixty threads at a time, and on the carding machine forty pounds of cotton can well be carded in a day—the warping machines, and other tools and machinery, part of which go by water, are all complete,—perform their various operations to great advantage, and promise much benefit and emolument to the patriotic adventurers."

PRESIDENT WASHINGTON VISITS THE PLANT

The factory was visited by George Washington, on his tour through the Eastern States, in 1789, and mention of it was made by Brissot De Warville, in October of the previous year, as "a flourishing manufacture of cotton."

President Washington alludes to newly invented carding and spinning machines, and that one of the latter spun 84 threads at a time, operated

by one person. He also wrote that he found "a number of looms (15 or 16) were at work with spring-shuttles, which do more than double work. In short, the whole seemed perfect, and the cotton stuffs which they turn out excellent of their kind—warp and filling both cotton."

On August 1, 1790, a report of the managers showed 636 spindles in operation, or nearly nine times the number which Samuel Slater installed at Pawtucket, the following December, his two Arkwright frames having a total of 72, but, of course, the latter invention could spin a much greater quantity of yarn than could be produced on a spinning-jenny of the same number of spindles. But it is clearly apparent that the Beverly enterprise was on a much larger scale than the factory of Almy, Brown & Slater, a fact acknowledged by Moses Brown of Providence, R. I., of the latter firm, in a letter written to Moses Brown, of the Beverly concern, under date of April 19, 1791, in which he said that "your concern" (the Beverly plant) "being the first and largest," should lead in a movement to secure more adequate tariff protection.

It was reported in distant places that the Beverly factory was carried on with the Arkwright machines, but such does not seem to have been the case in the first instance. In a memorial to the General Court, in June, 1790, the managers announced that they had incurred more expense and difficulty than they had anticipated, especially in the purchase and construction of machines. They had then expended nearly four thousand pounds and many discouragements and great obstacles had been encountered by them. They pointed out that the group had commenced the business from a regard to the public advantage, and had sustained heavy losses without any present hope of emolument. But they asserted their efforts, under all the disadvantages, had proved that the manufacture was practicable and would, when established, prove sufficiently lucrative to support and extend itself, and afford a supply not only for domestic consumption but a staple for exportation. Much poor material was produced by careless workmen, whose wages had to be raised to prevent their desertion when half instructed, "in consequence of the competition of rival manufactories." The greater perfection and beauty in foreign goods were attributed to the superior skill, which workmen in long established manufactories exhibited, "but principally (they said) from the use of machines which your petitioners have as yet found too expensive for them to procure." This reference is supposed to be to the Arkwright machines. The managers asked that the General Court, in lieu of the grant of land previously made, afford some real and ready assistance, without which they felt they must abandon the enterprise.

They soon discontinued the business as a corporate body, and it was carried on by John Cabot and Joshua Fisher, who, on January 11, 1791, conveyed the property to Samuel Blanchard, of Wenham, for $2,630.29. He operated the factory on his own behalf until March 21, 1801, when a third interest in it was sold by him to George S. Johonnot, for $1,011.01. Some time prior to 1813 business ceased and a part of the machinery was sold. The factory was burned October 13, 1828.

In a letter written in 1863 to Samuel Batchelder by Joshua Herrick, who was employed in the plant when a boy, the statement is made that, "corduroys, velvets, thicksetts, and jeans" were manufactured in the brick factory while he worked there.

Apparently some of the sponsors of the enterprise were interested in Beverly's second cotton mill, erected in 1801, the story of which appears later in this chapter.

A steam factory company, with large capital, was incorporated and a mill erected on the site of the second enterprise, in 1841, but Beverly never became a cotton-producing center, although her next-door neighbor, Salem, early took rank as such.

THE MILL RIVER FACTORY IN WORCESTER

In the Massachusetts *Spy*, of February 5, 1789, there appeared this item: "Several gentlemen are about establishing a Cotton Manufactory in this town. A subscription for defraying the expense of making the spinning machine, called a 'jenny,' is already filled."

The deeds, which conveyed to the grantees the use of the land "so long as they may make use of any building which may be erected on said land for the purpose of carrying on the cotton and linen manufactory, or the manufacturing of any other kind of goods whatever," show that Levi Lincoln, Daniel Waldo, Jr., Samuel Chandler, Nathan Patch, Isaiah Thomas, and other of the leading men of Worcester of that era, with John Sprague, of Lancaster,—eighteen in all—were promoters of the enterprise. In the spring of 1789 the factory was erected on Bimilick, or Mill River, a small stream running at that point nearly parallel with Main Street, and a short distance east of it, and at a point near the present intersection of School and Union streets. Here a dam was erected, adjacent to the primitive plant.

On April 30, 1789, the *Spy* announced that: "On Tuesday last the first piece of corduroy, made at the manufactory in this town, was taken out of the loom. To say that it looks well, and equal to any of the same quality imported from a foreign market, might be thought only to be retailing the common prejudices of people in general in their own favor when they enter business, and view the first product of their labor. But, throwing partiality aside, we would observe that good judges speak highly of it, and give it a decided preference to that imported from Great Britain. The carding-machine, which is really a great curiosity, has been some time completed, as well as the spinning-machine. In a little time it is hoped that the quantity of corduroys, jeans, etc., made in this town will be sufficient to supply the inhabitants of this county, and be the means of saving a considerable sum of money among ourselves."

This hope was not realized, as, before the end of 1791, all of the promoters except Nathan Patch sold their interests. He petitioned the Legislature on January 23, 1792, for a loan of six hundred pounds, for seven years, in order that he might carry on the enterprise, but the General Court merely passed a resolve exempting the buildings, machinery and stock from taxation for ten years.

In 1799, Samuel Brazier, of Worcester, advertised for sale "jeans, corduroys, federal rib and cottons," thus indicating that the local enterprise had at least survived for a decade.

Apparently the factory was not operated long as the building was later sold, and removed to Main Street, where it served for a time as a store.

There is nothing in the record to conclusively demonstrate that the weaving was actually done in the factory by a power loom. The natural inference is that the products were woven on hand looms, which were prevalent at that period. If such was the fact, then the Worcester enterprise can scarcely claim to be the first where all the operations were performed by machinery operated by power.

THE HAVERHILL DUCK FACTORY

In the autumn of 1789, President George Washington, who visited Haverhill on his tour of New England, wrote, under date of November 1:

"In Haverhill is a Duck Manufactory upon a small but ingenious scale; at this manufactory one small person turns a wheel which employs eight spinners, each acting independently of each other, so as to occasion no interruption to the rest, if one is stopped; whereas, at the Boston Manufactory of this article, each spinner has a small girl to turn the wheel. The looms are also differently constructed from those of the common kind, and upon an improved plan."

At that period Samuel Blodgett was the owner of the duck factory operated in the town, but presumably the product was fashioned from linen, rather than cotton, as was the custom of the period, and at the time of President Washington's visit the enterprise had but recently started, indicating that in all probability it was not established until 1789.

DOCTOR MANNING'S IPSWICH WOOLEN MILL TURNS TO COTTON PRODUCTION

In 1792, Dr. John Manning received a grant from the Town of Ipswich covering the site for a woolen mill, and an additional lot of land the following year, as well as financial assistance from the Massachusetts Legislature, and erected a building 105 feet long, 32 feet wide and two stories high, of wood, which was completed in 1794. It was a somewhat unique structure in that only the upper story was devoted to manufacturing. About three-fourths of the lower floor was finished as a hall, for religious and social purposes, being furnished with pews, while the remaining space was divided into two rooms, which served as the law office of Joseph B. Manning, son of the proprietor, thereby making it possible to effect a combination of the law, religion and manufacture, under one roof—a triumvirate which in these days upon which we have fallen might occasion some skepticism as to its permanency. On the roof, and over the center of the structure, was an octagonal tower, to sustain the arms and sails of a wind-mill, by which it was proposed to operate the machinery—the only instance, so far as data unearthed by the writer indicates, in the entire history of Massachusetts manufactures where the application of wind was sought to drive textile machinery.

The Massachusetts Woolen Manufactory, by which the concern was known, engaged in the production of flannels and blankets for a short time, and then turned to cotton fabrics, but the venture proved unsuccessful, and in 1800 its operations ceased.

Nothing has been found to indicate that all the operations in cotton manufacture were carried on at the Ipswich plant, nor that power-looms were employed.

BENJAMIN SHEPARD'S WRENTHAM MILL

The success of Samuel Slater, in the introduction and use of the Arkwright system of cotton machinery, apparently led Benjamin Shepard to erect, in the southerly part of Wrentham, near the line which divided that town from Attleboro, a cotton mill that carried on operations with but little interruption for 101 years.

The mill, now known as the old Slater Mill, in Pawtucket, R. I., for which the claim has been made that it was the first cotton plant erected in America, was built on another privilege, nearly a half mile higher up

on the stream, and not until 1793, a year, and possibly two years, after Benjamin Shepard erected his Wrentham Mill.

That he built his mill as early as 1792 is evident from a petition which he addressed to the Massachusetts Legislature on June 2, of that year, and in which the statement was made that he "had been engaged for some considerable time in the manufacture of cotton fabrics of various kinds," with the primitive machinery and appliances then to be found very generally, in the farm houses of the locality. It is also apparent from the text of the petition that certainly as early as the spring of 1792, "at large expense," for that period, he had erected a mill, and procured machines, doubtless of the improved kinds later introduced by Slater, as he used the phrase "upon the most ingenious construction." While no action seems to have been taken that year on his petition he was given, on June 18, 1793, a loan of 300 pounds.

Shepard erected his mill on a small privilege, which he created by constructing a dam on a little brook, that ran through his farm, thus providing a pond of considerable size, which served as a reservoir. He engaged in the manufacture of fustians, cotton-velvets, and other similar fabrics of cotton for men's clothing, coloring his yarns in a dye-house, which he erected, and weaving the fabrics on hand-looms in a weave shop, which he built adjoining the main factory. His wife, Susannah, who appears to have been a woman of exceptional enterprise and ability, and who without doubt holds the honor of having been the first woman industrialist of Massachusetts, for some years conducted an industry on her own account, taking yarn and waste from her husband's mill, and working these materials into various fabrics.

THE EXTENT OF THE EQUIPMENT

Knowledge of the extent of Shepard's factory is obtained from a report made by a committee representing the Legislature which went to Wrentham and there examined the physical layout. The main factory was fifty feet long, twenty feet wide, and two stories high, and it was equipped with a carding-machine, operated by water power, two spinning-jennies, one roping-jenny, four looms, one warping-mill, machinery for singeing cloth, a calender, which were operated by horse-power, and dyeing and finishing departments. The committee reported that Shepard could card 100 pounds of cotton a week, that he could spin between 72 and 120 pounds each week, according to the size of the thread, and could weave, dye and finish 120 yards of cloth per week.

Apparently the extension of the loan from the state, which he petitioned for and which was granted, enabled him to make the industry self-sustaining. His youngest son, Silas, left the factory in 1806 to go to Taunton, where he became one of the proprietors and the manager of the first cotton factory erected in that town. His oldest son, Benjamin, Jr., removed to Middleboro, in 1810, where, with his father and brother, Oliver, a mill privilege was purchased and a cotton factory erected, to carry on the manufacture of cotton yarns. Oliver remained at Wrentham and on taking over the plant there in 1810 installed machinery especially adapted to the manufacture of counterpanes, which he continued to produce until his death, in 1814. Benjamin, Jr., then returned to Wrentham and the mill there was operated under the firm name of Benjamin Shepard & Son, until the financial crisis of 1837, when the concern failed.

The senior partner of the principal creditor firm offered the property to Benjamin N. Shepard, son of Benjamin Shepard, Jr., who entered

partnership with Thomas G. Ide, under the style of Shepard & Ide, and engaged in the manufacture of ingrain carpets, both of wool and of cotton and wool. They conducted a remunerative business until 1848, when the mortgage was foreclosed, and the plant was bought by John Hilliard, who, with Enoch Lord and William Adams, continued carpet manufacturing there.

Successive owners were Isaac H. Jones, Jr., and George W. Coons, and in 1864, the property passed to the Wrentham Manufacturing Co., which operated the plant as a woolen goods concern until 1870, when an assignment was made.

Francis B. Ray bought the plant in 1871 and devoted it to the manufacture of shoddy for three and a half years, when it was sold to Cook Brothers, who manufactured woolen yarns.

In 1893, after an existence of 101 years, the plant was destroyed by fire, which started from a kerosene lamp employed in lighting the mill. The plant was then being operated by one of the Cooks. Neglected since that time, elm trees, now several inches in diameter, have grown up in what was the center of the old factory, but there still remain evidences of the original water-power plant.

THE NEWBURYPORT WOOLEN MANUFACTORY AT BYFIELD

The textile experiment at Byfield, in Newburyport, often is referred to by historians as a cotton enterprise, but from its inception in 1793 to 1804, when John Lees became the owner, only woolen products were manufactured there. It is evident that the cotton weaving carried on at the factory, beginning in 1804, was not accomplished by power-looms.

In May, 1793, Arthur and John Scholfield landed in Boston from Liverpool and at once introduced themselves to Rev. Dr. Jedekiah Morse, at that time minister of the First Congregational Church, of Charlestown, with whose name they had probably become acquainted from the fact that his work, "Morse's Geography and Gazetteer," had a considerable circulation in England.

Doctor Morse was the father of Prof. Samuel F. B. Morse, the inventor of the magnetic telegraph, and took a deep interest in anything that tended towards national development and prosperity. The Scholfields informed him that they were woolen manufacturers, and thoroughly expert in the industry as it was then carried on in England. Doctor Morse provided for their immediate necessities, and, on June 20, they took into partnership John Shaw, a spinner and weaver, who had accompanied them from England. John Scholfield built their first machinery, completing a hand-loom and a spinning jenny, of forty spindles, on August 4, 1793, and immediately thereafter the manufacture of broadcloth was begun. The firm sold twenty-four and a half yards of black broadcloth and twenty yards of the mixed fabric on October 28, having produced the products in the house that Doctor Morse had hired for them in Charlestown. Being satisfied that with capital and water-power the production of broadcloths and other woolen fabrics could be conducted at a profit, he approached William Bartlett, a wealthy and enterprising merchant in Newburyport, who invited the Scholfields to move to that town for the purpose of starting a woolen factory with improved machinery, the plant to be constructed under their supervision. On December 1, 1793, they removed to the town, carrying with them their spinning jenny and loom, and there they immediately constructed a carding machine, which was set up and operated by hand in Lord Timothy Dexter's

stable. This experimental apparatus, with but a single cylinder, worked so effectively as to arouse great interest, and to excite hopes of ultimate success. A company was organized, consisting of thirty merchants and prominent citizens of the town, and the Legislature granted a charter to "The Proprietors of the Newburyport Woolen Manufactory," with authorized capital of $300,000.

THE PARKER RIVER FALLS WERE UTILIZED

A factory location was secured at the falls on Parker River, in Byfield, a parish of Newbury, about five miles from Newburyport, the land being purchased from Capt. Paul Moody, the father of the machinist of Waltham and Lowell who was to exert such a powerful influence upon the cotton textile industry of Massachusetts a few years thereafter. Work upon the mill began at once, a structure 100 feet long, 40 feet wide, and three stories high, being built. The machinery was constructed by Messrs. Standring, Armstrong, and Guppy, machinists, under the direction of the Messrs. Scholfield, who also continued the manufacture, on their own account, of woolen fabrics, on the machines they had brought with them from Charlestown, until October 12, 1794, when they sold the devices to the company and immediately removed to Byfield to operate the new factory. In addition to the loom and spinning-jenny they brought from Charlestown, the original equipment of the new plant included the single carding-machine they had constructed, and two other carding-machines, each equipped with two cylinders.

Here for five years they superintended operations, and in so far as the working of the machinery was concerned, it was entirely successful, the introduction of the improved wool-carding machines, adapted to water-power, marking the beginning of a new era in the woolen manufacture of the United States. But the hope expressed by the promoters that they were inaugurating a profitable industry was not realized, foreign competition and lack of adequate tariff protection being factors which could not be overcome. In the spring of 1799 the Messrs. Scholfield sold their interests in the enterprise, and removed to Montville, Conn. John Lees then became the manager of the plant, and, in 1804, William Bartlett sold the mill property to him for $8,500, taking a mortgage for the entire amount. He at once began the manufacture of cotton goods, having succeeded in shipping from England in casks, labeled "Hardware" a quantity of cotton machinery, including drawing and spinning-frames, or mule throstles, and in order to avoid suspicion he followed in another vessel. He employed this machinery in spinning wick-yarn and yarn for warps which were in much demand for household manufacture. The weaving of bed-ticking, coarse gingham, and sheeting, by hand, was soon added. He carried on business for some twenty years, during half of which period he was successful and made large profits, but in the summer of 1824 he became financially embarrassed and the mill was sold at sheriff's sale to Gorham Parsons, who disposed of an interest in one-half of the property to Paul Moody, the Lowell machinist and textile operator, for $5,455, and it was operated for the next five years under his supervision. When he died in 1831 the plant was leased for seven years to William N. Cleveland & Co., which manufactured cotton fabrics. For three or four years following 1839, Enoch Pearson manufactured wool-frocking in the mill, and later various tenants manufactured shoes and carried on the fulling of cloth, the production of billiard tables and bedsteads, in parts of the plant until it was burned October 29, 1859.

The mill-privilege and the seven acres of land, together with a few

small buildings that were not destroyed, were sold in 1860 to Daniel Lunt, who disposed of the property to Leonard A. Morrison and Horatio M. Howard, who at once erected a new mill, and engaged in the manufacture of fancy woolen yarns, which continued until 1874, when Messrs. Morrison, Howard & Pearson engaged in the production of straw-board, but this continued but a year. E. Andrews & Co. followed in the manufacture of leather board, but soon removed their business to Lancaster. The mill remained unoccupied until 1880 when Whittier, Ewing & Co. equipped the plant with two sets of woolen machinery, and began the manufacture of blankets. In 1886, the plant was enlarged and five sets of woolen machinery were installed, the business being continued under the style of Hugh U. Ewing & Co.

THE MILL BRED MANY INVENTORS

At least two of the mechanical geniuses of the nineteenth century were prominently identified with the original mill. Several mechanics and inventors who subsequently achieved a high reputation, two of them, at least, the highest in their time—and it might perhaps be said, in all the century following the close of the American Revolution, which period was characterized in the United States as no similar era in the history of any other country has been, by the display of inventive genius and mechanical skill—served their apprenticeship within its walls during its first decade of existence. It was here that Jacob Perkins began his remarkable career, and here that he first placed in operation his wonderful and uncanny machine for manufacturing cut nails.

It was here, too, that Paul Moody, born almost within a stone's throw of the mill privilege, received his first ideas of machinery.

In addition to these two, David Moody, brother of Paul; John and Samuel Dummer, Jacob Kent, and Eben Pearson, all well known during the early part of the last century for their mechanical ability, gained there the knowledge which enabled them to establish textile industries in Amesbury, and other towns and cities of the Commonwealth.

As has been said of this famous old mill: "It was the trainingshop for specialists in wool, in all the varied departments of manufacture,—dyeing, carding, spinning, weaving, and finishing,—the normal school in textile and mechanical manufacture, supported, not by the state, but by the 'Proprietors of the Newburyport Woolen Manufactory'."

SALEM MANUFACTURES SAIL-CLOTH, OR DUCK

The Duke de la Rochefoucauld Liancourt, a French nobleman, wrote in his "Travels through the United States of North America," made in 1795-6-7, that:

"Salem has a sail-cloth manufactory which employes a great number of skillful hands."

The raw material employed undoubtedly was linen, rather than cotton.

SAMUEL SLATER BUILDS AT REHOBOTH

The erection of the second cotton mill, in which Samuel Slater had an interest, was begun by him probably in the summer of 1799, in the town of Rehoboth, and in that part of the territory which later was set off to form the town of Seekonk, (incorporated March 26, 1812), and also of the terrain set off under an act of the Massachusetts Legislature, on March 1, 1828, to form the town of Pawtucket, Mass. By a change in the boundary line between Massachusetts and Rhode Island, made in 1861, the whole of the latter town, with the exception of a small portion east

of Seven Mile River, was embraced within the limits of what was then the town, but is now the city, of Pawtucket, R. I.

On June 22, 1799, the Legislature granted to Mr. Slater exemption from taxation on any mill he might erect in Rehoboth, for a term of seven years. He at once proceeded to complete and equip the Rehoboth Mill, which it is believed he started in the summer of that year. From 1800 to 1810 the business was carried on under the name of Samuel Slater & Company. The factory, 40 feet long, 26 feet wide, and two stories high, of wooden construction was painted white, and was known until its destruction by fire, in 1825, as the White Mill. The first production carried on was that of spinning cotton yarns, and later bed-tickings were made.

That these were produced while he still owned the factory is conclusively shown in an advertisement inserted in a Portsmouth, N. H., newspaper, in March, 1802, in which Joseph S. Gilman described himself as the agent for Samuel Slater & Co.'s products and announced that he had "received directly from their extensive and much celebrated Cotton Manufactory, at Rehoboth, Mass., a general assortment of single and two threaded yarn," also "Bed Ticking, as above."

William R. Bagnall, in his work, "The Textile Industries of the United States," says: "It is probable that, while its product was principally sold to persons in the vicinity, or even at a considerable distance, to be used in making homespun fabrics, a portion of it also was woven on hand looms, either belonging to the firm or to private persons working for the firm on contract."

In 1810, Slater disposed of his interest in the plant, and the new firm became Wilkinson, Greene & Company. Three years later, the facilities were increased by the erection of another mill adjoining the first unit, and as this was built of stone, it became known as the "Stone Mill." This plant then had about 2,100 spindles. Many changes in ownership followed the lean years just subsequent to the War of 1812, and in 1825 both mills were destroyed by fire, causing a loss of $55,000, but they were promptly rebuilt, and operated until 1829, when financial difficulties overwhelmed them. Many changes of management took place in after years.

THE MILK ROW BLEACHERY & DYEING CO.

In 1801, the Milk Row Bleachery & Dyeing Company, was established in what was then Charlestown, now included within the geographical limits of Somerville—probably the first separate bleaching and dyeing establishment set up in the Commonwealth. The story of this enterprise is carried at length in the chapter devoted to the industries of the city of Somerville.

In 1801, Moses Hale set up in that part of Chelmsford, now embraced within the territorial limits of Lowell, the first carding mill operated by power, in the United States.

BEVERLY'S SECOND COTTON MILL, BUILT IN 1801

The second cotton mill in Beverly was erected in 1801, by James Burnham, on a mill-privilege on Bass River, a small stream which, rising in Danvers, flows some six miles into Beverly Harbor. Here he built a wooden factory, 50 feet long, 30 feet wide, and two stories high, in which operations began in 1802, the equipment consisting of three carding machines, one drawing-frame, one roving-frame, six spinning frames of 72 spindles each, with subsidiary machines, apparatus and tools. In 1803 Burnham disposed of his interest in the factory, and at that time it was

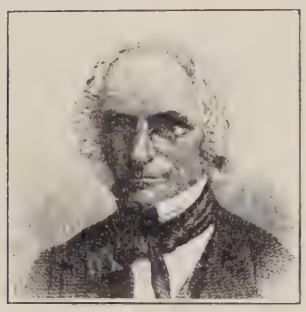
equipped with 648 spindles. In all probability it went out of business after the close of the War of 1812, as nothing can be found as to its subsequent history.

Joshua Herrick, who had been employed in the first cotton factory erected in Beverly, in 1788, is authority for the statement contained in a letter written by him to Samuel Batchelder, in 1863, that "the old brick factory went till the other started, and I think the looms continued to make goods from yarns made at the other mill. I recollect distinctly that, as soon as the last mill stopped, (the factory erected in 1801) my father started off to Mr. Slater's Mill, and purchased a large quantity of warp and filling, and employed some of the best weavers to make bed-ticking, shirtings, sheeting, and table-cloths. Such tickings I have never seen since. The blue was colored with the best indigo, and the white bleached upon a platform in the sun, and it sold for seventy-five cents, and three-fourths shirting for fifty cents per yard."

SETH BEMIS—WATERTOWN'S TEXTILE ENTREPRENEUR

It seems somewhat strange and inexplicable that, with so much research carried on by those who possessed ample opportunities to secure accurate information, and who were eye-witnesses of events that occurred in the industrial life of the Commonwealth simultaneous with their writings, the claim of Seth Bemis, of Watertown, as one of the earliest successful manufacturers of cotton fabrics in the United States should have been almost studiously overlooked and completely ignored.

Samuel Batchelder, one of the most reliable, erudite and thoroughly informed authors on the early textiles, in his work, "Introduction and Early Progress of the Cotton Manufacture in the United States," referring to several mills established in this state, and in Rhode Island and New Hampshire within the decade previous to the close of the second war with England, (1812-15), makes no reference to the cotton mill established at Watertown, at a date much earlier than any he mentions. And again, Nathan Appleton, one of the sponsors of the Boston Manufacturing Com-



SAMUEL BATCHELDER
of Boston
Who in 1833-34 invented and applied the first stop-motion to the cotton frame



NATHAN APPLETON
of Boston
One of the original proprietors of the Waltham Cotton Factory, now the Boston Manufacturing Company

pany, in his able work on "The Introduction of the Power Loom," makes the singular statement that the first unit of the Waltham concern, with which he was so prominently identified, was erected on the site of the Bemis Paper Mills, evidently ignorant or forgetful of the fact that the plant of the paper unit was a mile and a half below the location of the first factory of the Boston Manufacturing Co., and in Newton, on the opposite bank of the Charles River, and that, on the same water privilege

with the Bemis Paper Mills, but on the Watertown bank of the stream, there had been established more than ten years before the purchase by Patrick Tracy Jackson, his industrial associate, of the land and mill privilege in Waltham, which Jackson afterward conveyed to the Boston Manufacturing Company a mill for the manufacture of a variety of cotton fabrics, which was still in successful operation when the Waltham enterprise was launched, and which had been established by Seth Bemis, in 1803.

He was the son of David Bemis, a real estate operator, joiner, and cabinetmaker, and in 1753 had purchased 39 acres of land, adjoining which was the mill privilege afterwards occupied by the Bemis Mfg. Co. In the fall of 1778, David Bemis, and Dr. Enos Sumner, who had bought half an acre of land on the Newton side of the Charles, opposite the premises of Mr. Bemis, with one-half the stream and with the privilege of erecting a dam, five feet high above the bottom of the proposed water wheel, jointly built the structure, and Mr. Bemis established a grist mill on the Watertown side, and also commenced, before 1790, the manufacture of snuff at that location. In 1779 Dr. Sumner sold his holdings, including his interest in the dam and mill privilege to John D. McDougal, a book-binder, of Boston, Michael McCarney, a Dorchester paper-maker, and Nathaniel Patten, a book-binder, of Hartford, Conn., who erected a paper mill. By various transfers between 1780 and 1790, the paper mill, with the realty connected with it, became the property in equal shares of David Bemis, and his son, Luke, and when the former died, in 1790, he bequeathed his interest in the paper mill to his son, Isaac, and one-half of the grist mill and the snuff-mill to his sons, Luke and Isaac. Four years later, when the latter died, his heirs transferred their interests to Luke, who then became proporietor of the property on both sides of the stream. It was the practice at that period to give notice of the opening and closing of the working hours by the blowing of a tin horn at the home of Luke Bemis, and as the result of this custom the village received the euphonious title, which it bore for many years, of "Tin-Horn Village." In 1796, Luke Bemis sold to his youngest brother, Seth, one-half of the mills on the Watertown side of the Charles, consisting of grist, snuff and rasping mills, the operations of the last named plant consisting of the reducing of dye-goods to fine particles by submitting the logs to the action of a revolving cylinder, thickly studded with steel points.

HE INSTALLS COTTON MACHINERY, IN 1803

Two years later, Seth bought his brother's half interest in the mills in Watertown, and, becoming sole proprietor of the units, introduced the manufacture of chocolate, followed in 1803, by an addition to his plant, in which he installed machinery for carding and spinning cotton and for making cotton warps. These he consigned to a store on Cornhill, in Boston, and the demand for the "Bemis warp," as it was styled in the trade, was such as to give constant and profitable operations, at Watertown. In 1807, his mill and another cotton factory which had been established by Jeduthun Fuller et als, at Watertown, were exempted from taxation for five years.

Early in 1807, Mr. Bemis installed a number of hand-looms and began the manufacture of sheetings, shirtings, and bed-ticking, and two years later he added sail-cloth, or duck. Up to that time, this fabric, both of foreign and domestic manufacture, had been manufactured only from linen or flax-yarn, but locally the production of linen duck had ceased because of the inability of manufacturers to successfully compete with the English product after the bounty, offered by the Massachusetts Legisla-

ture, had expired by limitation. It was necessary to twist the yarns before weaving them, and in March, 1809, Mr. Bemis employed Hezekiah Douglas, an ingenious Watertown mechanic, to manufacture for him a "twisting machine" of 48 spindles, and the following October he hired six English weavers to operate the hand-looms which had been especially constructed to weave cotton duck. Sails made from the Bemis product were cut and installed in Boston, in November, of that year.

For many years priority in this specialty has been claimed for Baltimore, Maryland, but cotton duck was not made there until several years after the successful inception of its manufacture by Seth Bemis, at his Watertown factory.

As was the case with almost every type of domestic fabric, a strong prejudice was manifested against it at the outset, especially among seamen, but it gradually won its way to general adoption, the embargo of 1807, when the importation of foreign fabrics of every kind practically ceased, being helpful. Within a few years, Mr. Bemis was operating his Watertown factory at capacity in producing duck, and he contracted for the labor of convicts at the State Prison, in Charlestown, where he installed a large number of looms. In 1812 and 1813 he sold $20,000 worth of duck, in Baltimore, and another house in the same city disposed of $21,000 worth in 1815.

After the opening of the War of 1812, the coasting trade became so precarious and uncertain that Mr. Bemis supplied his southern trade by transporting his manufactured goods overland by his own teams, sending them as far as Baltimore, Alexandria, and to Richmond, Va. The teams brought back, as return freight, flour, tobacco, and other articles produced in the south.

MR. BEMIS LIGHTS HIS PLANT BY GAS

In the autumn of 1812, Mr. Bemis erected a small brick gas-house at the east end of his mill, and introduced illuminating gas into the plant—probably the first successful installation of coal gas in this country for the purpose of illuminating an industrial plant,—and antedating by four years the first use in the United States of coal gas for municipal lighting, which took place in Baltimore, in 1816, when Rembrandt Peale, the celebrated artist, and others, erected works for that purpose. Even New York did not move in the matter of providing for the illumination of its streets or buildings by gas, until 1816. Mr. Bemis' experiment was entirely successful, and continued for several years until the tin pipes through which the illuminant was conducted became so corroded and leaked so badly that much of the gas was wasted, while its odor was offensive, and there existed danger of fire.

Among other machines developed by Mr. Bemis was one for picking cotton, which did not differ materially in principle from those now employed for the same purpose. To it was given the name of "devil," and although not attractive in name or appearance it performed the work expeditiously, and with much saving in the cost of production.

In 1816, he introduced power-looms into his factory, which reduced the cost of producing a yard of cotton duck from 14 cents to nine-tenths of a cent per yard.

If the statement of the Waltham historian is to be relied upon that on February 2, 1816, the first record of the production of cotton cloth, at the plant of the Boston Manufacturing Co., was made, then it would seem that the introduction of power-looms in Seth Bemis' Watertown plant was coincident with that event. All operations—carding, spinning and weaving on hand-looms—had been carried on at the Bemis plant since 1803.

Prior to 1810, Mr. Bemis installed in his Watertown plants machinery for grinding and cutting glass, and for polishing lights for lighthouses, and provided for the insertion of lights of glass in the decks of vessels, and binnacle lights, under a patent granted in 1809 to Capt. Winslow Lewis, of Boston. He also made and repaired machinery. Shortly after 1816 he discontinued the manufacture of cotton duck, as, in common with most cotton and woolen fabrics, the product suffered by competition with foreign goods, which, at the close of the war, were imported into this country and sold at such prices as to prostrate all domestic textile industries.

In 1821, he bought from Bemis & Eddy the paper mill, with twenty acres of land adjoining it, in Newton, and began the manufacture in that plant of satinets, the cotton warps and the woolen yarns required for filling being manufactured in his mills on the opposite side of the Charles River. In 1830 he resumed the production of cotton duck, selling the special machinery he had built for this product to the Old Colony Duck Co., in 1836.

On February 3, 1827, he and four others incorporated the Bemis Manufacturing Co., with $300,000 capital, but buying all of the stock of the other incorporators, in 1839, he formed the firm of Seth Bemis & Son. In 1847, the mill on the Newton side of the river was sold to William Freeman, of Boston, but the Watertown units were operated without change until the death of Seth Bemis in 1851.

A year later, Seth Bemis, Jr., became sole owner of the enterprises, but deciding to retire from active manufacturing and devote himself to his investments he leased the plants to Hiram Cooper and Samuel Langley, of Watertown, who continued the manufacture of cotton and woolen yarns until 1860, when Mr. Bemis disposed of the property to William Freeman & Co., who, on March 12, 1863, conveyed the plants to the Aetna Mills, which concern still owns them.

ABRAHAM MARLAND MANUFACTURES COTTON YARN, IN LYNNFIELD

Abraham Marland, who became a prominent manufacturer in Andover, removed from Beverly to Lynnfield, in 1803, where he built a small mill and began the manufacture of cotton yarns for knitting and weaving, remaining there a little less than four years, when he went to Andover.

There is no evidence, however, to indicate that any weaving was carried on in his pioneer factory.

THE BEAUMONT MILL IN CANTON

On March 14, 1803, James Beaumont, Abel Fisher and Lemuel Bailey, of Canton, agreeing to enter into partnership and carry on the cotton-spinning business, formulated the following document:

"Be it known that we, James Beaumont, Abel Fisher and Lemuel Bailey having provided a Building and Machinery for Spinning Cotton Yarn upon the eastern branch of Neponset River in the town of Canton, in the county of Norfolk, Do enter into the following articles of agreement.

"1st—We shall be known and transact Business under name of James Beaumont & Co.

"2nd—That the Stock shall amount to twenty-four Hundred Dollars, and be advanced by each one in the following proportion, Viz:—

"Said James Beaumont shall advance sixteen hundred dollars
" Abel Fisher " " four " "
" Lemuel Bailey " " " " "

"making the whole stock to amount to Twenty-four Hundred Dollars as afores'd.

"3rd—It is agreed that the whole Cost of erecting s'd Building, and procuring the Machinery shall be considered as part of money advanced towards stock, and each shall be credited as he has advanced and that the privilege of water, and also of land on which s'd Building is erected, or any additional Improvement that may be made and other convenient necessary Room for carrying on s'd Business or manufactory shall continue five years from the date hereof.

"It is also agreed that the work people may be boarded by the partners in proportion to their respective rights in Stock provided nevertheless, that the place of board be conveniently near the factory and the food and Drink be of such Quality as is fit and necessary to comfort and invigorate people employ'd in s'd Business and that the rate of Board allowed each partner shall be similar in similar Circumstances.

"In Testimony of our mutual Consent and confirmation of every clause and article of the foregoing, we the parties aforesaid have hereunto set our hands and Seals this fourteenth Day of March in the year of our Lord Eighteen hundred and three.

"Signed Sealed and delivered each partner in presence of Elijah Dunbar, Thomas Dunbar

"James Beaumont
"Abel Fisher
"Lemuel Bailey"

In his eightieth year, James Beaumont wrote his "Reminiscences of Canton," from 1803 to 1813, and asserted that the factory erected by him and his associates, Messrs. Fisher and Bailey, was equipped with three cards, a drawing and roving frame, and 144 mule spindles, all the machinery being made by himself, with the assistance of other workers. He stated that wick yarn for candles was the first product manufactured, and that a year or two later eleven bales of cotton were made into wicking in a year's time.

This was followed by warp and filling for "domestick cloth" and that the first piece of the latter was for sheeting, and was fabricated from Sea Island cotton, being warped on a common warping frame and "sized in the chain." "I wrung it out of the size tub myself, hand over hand. Tattershall, an English weaver, made good cloths of it. Thus, in 1803, was the first piece of cotton cloth ever made in America from mule yarn, either all or in part. I sold such cloth at 50 cents P. yard, & shirting from 35 to 42 cents P. yard. I put a sample of my first sheeting in the Museum, at Lowell, 7 or 8 years ago."

Beaumont's story is to the effect that his partners did not care to continue manufacturing. It is apparent from his reminiscences that they were of a speculative turn of mind, and that their object was to build the mill, get it to a point where production was profitable, and then dispose of the property advantageously. But Beaumont was so successful, according to his statement, that he continued his operations, although he received offers from others to enter partnership with him, among them being one from J. Smith Boies, of Dorchester, who proposed that Beaumont sell the Canton mill, and remove to Dorchester, where Boies would build a factory on a large scale. This offer was declined by Beaumont, who wrote: "I had so much toil and care in getting my little concern in Canton under way that I had no desire to move."

THE DORCHESTER COTTON AND IRON CO.

According to Beaumont's statement, Boies began the erection of a factory, in 1807 or 1808 which "was without doubt the most prosperous & Profitable concern of the kind ever established in the Union. There were made Bedticks, Ginghams, Shirtings & Sheetings, in large quantities in the time of the Embargo and 1812 War; and long after." Beaumont wrote that Boies bought large quantities of cotton prior to the War of 1812, at low cost and sold it during the struggle for four or five times the original price.

But the History of the Town of Dorchester, published in 1859, by the Dorchester Antiquarian and Historical Society, seems to indicate that Beaumont became a trifle over-enthusiastic concerning the Boies enterprise, as there is not a trace of a cotton weaving concern having existed there prior to the second decade of the nineteenth century.

The local history records that on "July 4th, 1811, an incorporated company, styled the Dorchester Cotton and Iron Company, purchased the privilege of Mr. Boies, (Jeremiah Smith Boies), and immediately commenced putting up a cotton-mill,—intending, at a future day, to add a mill for turning and finishing up iron to be used in machinery. Mr. Boies was appointed agent of the company. As soon as the building was completed and the machinery in, the company commenced the manufacture of cotton cloth. From the first their business was successful, proving a paying concern to its owners, and a blessing to the community around them, as it furnished much work for the women and children in the neighboring towns, during the stagnation of business in the War of 1812. The cotton, at that time, was delivered at the mill to such as chose to take it home and cleanse it from its seeds and other foreign substance. It was then returned, and carded and spun. The yarn was then taken around in the neighboring towns, and wove by hand in families—about eight cents a yard being paid for the weaving."

It is obvious from this excerpt that no weaving was done at the plant, and consequently it seems wise to dismiss the Dorchester experiment as rivaling in any way the Waltham concern.

In Daniel T. V. Huntoon's History of Canton, issued in 1893, it is stated that in 1802 a cotton mill was erected on the lower privilege of the east branch of the Neponset by Beaumont and his associates; that the following year the spinning of cotton yarn began in the plant, the first that was produced being used by the candle-makers; that subsequently warp and filling yarn were made for domestic cloth, and soon after (no date given) cotton cloth was manufactured.

Huntoon asserts that the Beaumont and Wheatley partnership was dissolved in 1808, and that in 1809 Beaumont's factory passed to Richard Wheatley, David Wilde, and John Waterman, and that the building was destroyed by fire, in 1814. Even though the Canton author gives no definite date as to when cotton cloth was turned out there it is perfectly obvious that it must have been manufactured prior to the completion of the Waltham plant, inasmuch as the original Beaumont factory was destroyed by fire, in 1814.

Huntoon is also authority for the statement that after Beaumont sold his interest in the original factory, he built another, which, in 1897, was used as a dwelling house, in Canton, known as the British Block, and that at this new factory Beaumont manufactured satinet and pelisse wadding. According to Huntoon, Mr. Wilde bought in 1810, the first power-loom that came to Canton; that it was so complicated it required

six days to set it up, and at the end of 15 days it was given up as worthless; that the next power looms were built by Crehore, of Milton, and placed in operation at Crane & Wilde's factory, on Steep Brook, and "they were among the first in the state that made good cotton cloth." Unfortunately, Huntoon gives no dates in connection with the building of these successful cotton looms.

The genealogy of the Crehore family reveals the fact that Benjamin Crehore, skilled in invention, was born in Milton, and always lived there. In 1798, he "was engaged by the proprietors of Federal Street Theatre (Boston) to assist in getting up the machinery and appliances of the stage for the play of the 'Forty Thieves,' about to be introduced. The inventiveness and skill manifested in the nice adjustment and execution of the work intrusted to him were greatly admired by the managers, and brought his services into frequent demand." He became interested in the repair, and later the manufacture of musical instruments, and in his Milton shop, in 1790, he made the first piano produced in Massachusetts, which is now on exhibition in the Brown Music Room, of the Boston Public Library. The Vose piano business, alluded to elsewhere in this history, is said to have had its genesis in Crehore's shop. All of this would seem to point to him as the inventor or builder of power looms for cotton manufacture, as he flourished at the period when Huntoon states that such mechanical appliances were installed in Crane & Wilde's factory.

Beaumont also asserts in his reminiscences that he produced at Canton, yarns, bedticks, sheeting, shirting, plaids, checks, ginghams, and cotton pelisse wadding, receiving large orders from New York and Boston for the latter product, which he stated was not manufactured at any cotton factory in the United States, except at his Canton mill. He explained that he made it in 1802-3 by running the carded batts through rollers, wet with size, and that he afterwards received a patent for the invention, which was not improved upon for thirty years thereafter. He claimed that milliners carried advertisements, reading "Beaumont's pelisse wadding, sold here," and that prior to the production of this commodity the millinery trade was dependent upon supplies from France.

Beaumont makes the assertion in his reminiscences, that when Richard Wheatley withdrew from the partnership, about 1807-8, the latter built a factory on the east side of the Neponset River, where he set up a wool carding establishment, while Huntoon states that Messrs. Wheatley, Wilde and Waterman took over the old Beaumont plant.

Beaumont's recollection was that Wheatley engaged Wilde to operate the mill for him, and that the latter also assisted Gen. Elijah Crane, who owned a water privilege in Canton, in building a cotton factory and the machinery which operated it.

THE MARSHFIELD COTTON & WOOLEN CO.

Beaumont also states that Azel Ames, who started business as a house carpenter, and who was employed by both himself and Wheatley in building the wooden parts of machinery, went to Marshfield, with his brother, and erected and operated a successful cotton factory, which Beaumont claims "was in full operation years before the Waltham experiment" was undertaken. That he was correct in the statement that Ames did go to the Barnstable County town seems perfectly clear.

In the History of Marshfield, written by Lysander S. Richards, and published in 1905, the author states that upon facts furnished him by Dr. Azel Ames, there settled in Marshfield, in 1810, Capt. Azel Ames, and his brother, Elijah, both of old Bridgewater and Braintree stock, and

that they came to the town "to build a factory for the Marshfield Cotton & Woolen Co.,—the eleventh cotton mill in the United States," which was erected where the Chandler mill stood later, and on the same dam.

It appears that Captain Azel and his brother operated the mill, and that "the Captain chiefly and ultimately (practically) owned and ran it, and made money." In its day it was the life and center of town affairs, and around it most of the local activities revolved. Soon after the death of Capt. Azel Ames, in 1842, it began to decline, although Elijah continued to operate it until 1866.

Dr. Ames says: "The one (Captain Azel) was a born manager, leader and organizer, executive and broad for his day. The other, (Elijah) a superb mechanic, fertile in reasoning, invention and expert."

Here again the nature of the equipment, the type of product and the question of whether all the production was carried on within the walls of the factory, are shrouded in doubt, but it does seem reasonable to believe that even in its beginnings, in 1810, it must have been provided with as complete a set of cotton machinery as existed at that period.

BEAUMONT MANUFACTURES SATINETS

If as claimed by James Beaumont, he began the manufacture of satinets immediately or soon after the erection of his second mill in 1808, to him must be accorded the credit of having been the pioneer producer of that type of fabric which later became a leading branch of woolen manufacture, and which many claim was first produced in Massachusetts by Abraham Marland, at the Marland Mills, in Andover.

In 1823, Beaumont sold his factory to Joseph W. Revere, of Boston, who, the following year disposed of it to The Boston & Canton Manufacturing Co., for $60,000. In 1831, that concern conveyed the property to the Neponset Company, which was capitalized for $200,000, and which had as its original officers some very distinguished Massachusetts citizens, Harrison Gray Otis being president, Caleb Loring, Samuel Fales, and Robert Gould Shaw, directors, and John S. Wright, clerk and treasurer. In the financial crisis of 1837 the company became financially embarrassed and the assets were sold by the assignees to Mr. Revere, who, in all probability transferred it to the Revere Copper Co., as, in 1844, that corporation leased the mills to Andrew Robeson & Sons, of Fall River, for fifteen years. In 1848 when that concern made an assignment, the title passed to a new corporation known as the Neponset Cotton Factory, which operated the plant until 1870. About 1882 a part of the factory was leased to the Neponset Mills.

EZEKIEL HALE'S HAVERHILL COTTON MILL

In the spring of 1804 a cotton mill was established in Haverhill, by Ezekiel Hale, which was changed in 1833 into a woolen factory, and became the germ of the present extensive woolen plants, located on the same site and owned and successfully operated since July 4, 1855, by M. T. Stevens & Sons Co., of North Andover. For at least eight years before 1804, Ezekiel Hale had been the owner and operator of saw and grist mills, on a privilege located on Little River, in Haverhill, about a half mile above where it joined the Merrimack.

In the summer of 1835, Ezekiel and Samuel Hale, father and son erected a brick factory, adjoining the mill built by the former, in 1804, the old structure being 59 by 27 feet, and four stories high, and the new brick unit 95 by 34 feet, and four stories in height.

On January 2, 1843, Ezekiel Hale, Jr., another son, conveyed to his

son, Ezekiel J. M. Hale, the saw and grist mills, flannel factory, and dwelling houses, this transfer indicating that the production of flannels had been undertaken at the plant.

Unfortunately, there is no information available that indicates what type of cotton production was carried on at the Hale factory between 1804 and 1833, when it became a woolen mill.

ARTHUR SCHOLFIELD PRODUCES BROADCLOTH, AT PITTSFIELD, IN 1804

In 1804, Arthur Scholfield, whose activities in Boston and Essex County, in the manufacture of woolens, are treated in this chapter, turned out, at Pittsfield, the first yard of fine broadcloth made in the United States, fashioned from the fleece of imported merino sheep, flocks of which had been purchased by Berkshire County farmers, who were anxious to improve the quality of raw materials entering into the textile production of that period. This fabric was woven on machinery of his own construction, and, in 1808, he produced a 13-yard piece of black broadcloth, which he presented to President James Madison, who had the material made into his inaugural suit of clothes.

Scholfield's Pittsfield venture is treated at length in the chapter devoted to the industries of that city.

THE MEDWAY COTTON MANUFACTORY

In 1805, Luther Metcalf, Philo Sanford, Abijah Richardson, William Felt, Nathaniel Miller, and John Blackburn formed a partnership and engaged in carding and spinning and in manufacturing cotton, in Medway. The original mill was 60 by 30 feet, two stories high and was first operated in March, 1807, being equipped with 880 spindles.

Two years later the concern was incorporated as The Medway Cotton Manufactory, with authorized capital of $50,000 real, and $100,000 personal estate. Burned on October 11, 1811, it was immediately rebuilt as a three-story structure.

The story of this mill privilege on the Charles River, which is still in use, goes back to the beginning of the eighteenth century, and is not equalled in age by any other along the banks of the stream. Four citizens of Medfield built a grist mill on the site, prior to 1703. In that year, Benjamin Clark deeded one-half of his quarter interest in a mill located there to his son, Edward.

Benjamin Clark lived on the estate, in Medway, where the famous Pratt house now stands, which was popularly believed to have been spared by the Indians, under King Philip, in 1676.

A wheelwright by trade, his four sons were included in the list of incorporators of the town of Medway, in 1713.

In 1706 the five owners of the mill deeded their property to John Whiting who operated a mill, in Wrentham, on the old "Eagle" privilege and who owned Whiting's Pond, now known as Lake Pearl. He was a grandson of Nathaniel Whiting, the first miller, of Dedham.

The deed described the property in these words: "All our right, title, and interest, in a grist mill and lands appertaining, with the irons, stones, dam, housing, and implements in and about the mill. Said mill standing upon Charles River in Medfield and up stream on said river from a place commonly known as the Bent of the river, said lands lying on both sides said river in Medfield and Wrentham."

Mr. Whiting never operated the mill, but placed his son, Nathaniel, a lad of sixteen, in charge, who upon attaining his majority, was given a deed to the property.

Nathaniel Whiting was a captain in the French Wars, and in 1756, deeded the property to his son and namesake, Nathaniel, Jr. The latter died about ten years before his father, in 1770, and for more than thirty years the mill was conducted by his widow, Lydia Partridge Whiting, one of the three women mentioned in the volume entitled, "Massachusetts Soldiers and Sailors of the Revolution." In her honor, a chapter of the Daughters of the American Revolution, in Newton, has been named.

She was aided in the operation of the mill by her sons-in-law, Philo Sanford, and Luther Metcalf. For many years The Medway Cotton Mfg. Co. was prosperous and from its plant went many men who achieved fame and fortune in later years, including Lyman Tiffany, Dr. Oliver Dean, Royal Southwick, Alexander and Duncan Wright and others.

The mill was operated without interruption until 1864, when the property was sold to James P., Francis B., and Joseph G. Ray, of Franklin. They disposed of it the same year to William A. Jenckes, of Bellingham, who formed the Medway Flax Co., to manufacture flax. In 1881 the title passed to a new corporation, known as the Sanford Mills, the old factory being sold at auction, that year, for $1.50 on condition that it should be removed within ten days. A new plant was erected of brick 106 by 55 feet, and three stories high, which was leased to Samuel Hodgson, for the manufacture of fine cassimeres, said to have been equal to the finest imported fabrics.

During the next thirty years, Charles C. Capron, of Uxbridge, Cole, Senior & Co., of Woonsocket, R. I., the Pine Tree Woolen Co., and others, operated the plant.

In 1910 the Fabyan Company of Stafford Springs, Conn., bought the mill and under its able management it has grown to many times its original size.

A large part of the land holdings on the Medway side of the river are covered with new mill buildings. A concrete dam holds back a body of water that produces many times the power the former mill pond and dam provided. The equipment is operated at full capacity by night and day shifts, and the Fabyan Woolen Co., incorporated in 1904, is the foremost industry of the section. It is one of the few textile concerns in America that can boast of a lineage of more than two centuries and a quarter.

THE PAWTUCKET COTTON AND OIL CO., OF REHOBOTH

The site of the mills of the Pawtucket Cotton and Oil Mfg. Co. was owned, near the close of the eighteenth century, by Ebenezer Tyler, II, of Rehoboth, and was located in that part of the town bordering on the Blackstone River, which since 1861, when a change took place in the Massachusetts and Rhode Island state lines, has been in Pawtucket.

The factory was located south of the "White Mill" erected in 1799, by Samuel Slater & Co., and on February 7th, 1805, the promoters of the new enterprise, Oliver Starkweather, Ebenezer Tyler, II, Eliphalet Slack, and Elijah Ingraham, petitioned the General Court for an exemption from taxation, and pointed out that there already was "an establishment, of the same kind in that place," (Slater's), "that, by the indulgence of the Legislature, has been exempted from taxation for a number of years." The General Court granted the request of the incorporators for a term of five years.

The new structure was of wood, and painted yellow, and it early took the name of the "Yellow Mill" to distinguish it from Slater's "White

Mill," on the same side of the river, and Almy, Brown & Slater's "Green Mill," located on the opposite bank.

Associated with the above, as original stockholders, were Benjamin S., and John Walcott, and Nathaniel Croade. The enterprise was successful from the start and in 1813 a second mill, built of stone, and nearly twice as large as the original structure, was erected, and two years later the two units housed 3,300 spindles.

For seventeen years following the inception of the concern no change was made in the ownership of the shares,—an exceptional record at that period.

While the petition to the Massachusetts Legislature for tax exemption specifically stated that the promoters contemplated "erecting a cotton factory on a scale sufficiently large and extensive to meet the increasing demand for yarn," there is evidence that in addition to cotton yarns, some type of fabrics was produced prior to 1824 when a division of the two mills was made. For many years Messrs. Pitcher & Brown manufactured cotton machinery in the "Yellow Mill," and from 1824 to 1829 the Washington Bed Tick Co. occupied a part of the structure in producing bed-ticking. Subsequently Thayer & Pitcher bought the plant, and operated it until 1856, in the manufacture of fine cotton fabrics, being succeeded by Cornelius Barrows who produced coarse cotton goods.

Successive owners continued occupancy until 1890, cotton fabrics and paper being produced there between 1858 and 1890. The Stone Mill was ultimately taken over by The D. Goff & Sons Co., and occupied until 1872, when it was torn down and a new brick structure was erected.

A 500-SPINDLE PLANT, IN WATERTOWN

On January 3, 1805, Jeduthun Fuller, of Beverly, Joseph Pierce, Jonas Woods, Enoch Wiswall, and Uriah Moore, all of Watertown, entered into an agreement to spin cotton yarn, and the following March enlarged the mill and installed a water-wheel of sufficient size to operate 500 spindles, the group being exempted from taxation for five years by the Legislature of 1807. The concern became known in 1810 as Wiswall, Fuller & Co., and at that time the factory was 54 by 32 feet, four stories high, of wood, and was equipped with eight water-frames of 48 spindles each, one mule of 144 spindles, and two doubling and twisting frames. Four years later it had capital of $45,000, and in 1815 was incorporated as the Watertown Cotton Factory Co., with authorized capital of $50,000 real, and $100,000 personal estate.

In 1820 Whitewell, Bond & Co., of Boston, purchased the property, disposing of it seven years later to William Parker and Lawson Valentine, who subsequently sold it to Alexander and Mehitable S. Fuller. Probably it was not operated as a cotton unit after that time.

In 1806 the cotton mills of the Dighton Manufacturing Co. were erected, on Three Mile River, in Dighton, followed a few years later by the erection of a foundry and machine shop for the construction of cotton-spinning and cotton-weaving machinery. Not until 1843 were the latter buildings converted into a woolen mill.

THE "GREEN" OR TAUNTON COTTON MILL

In 1806 the first attempt was made to manufacture cotton yarns in Taunton when Silas Shepard, and Simeon, Joseph and James Tisdale, became partners and erected a factory which for years was known as the "Green Mill," and in which spinning was carried on for twelve years.

Samuel Leonard and Samuel Crocker were also identified with the enterprise at its start, while Jesse Hartshorn and Thomas Bicknell, both expert in the manufacture of cotton, assisted Shepard in the undertaking. Some of the yarn produced in the earlier days of the concern was colored, and all the product was placed in the hands of families in the vicinity who wove it into checks, ginghams and tickings. In 1818 an addition was made to the mill, and the same year power-looms of the Gilmour pattern were installed, and the production of checks, ginghams and tickings was begun in the factory.

Silas Shepard was not only a skillful cotton manufacturer, but an ingenious mechanic as well, and during his connection with the enterprise he invented several machines, one or two of which were effective contributions to textile mechanics. On October 14, 1816, he patented a winding machine, while a power-loom, which was the joint product of himself and John Thorpe, then of Taunton, and later of Providence, R. I., was patented by them on July 25, 1816, but this device did not prove successful. It was brought into close competition with the "Scotch Loom," so-called, which had been introduced into this country by William Gilmour, and which represented the sum total of numerous experiments begun in England, by Rev. Dr. Edmund Cartwright, in 1785, and continued for twenty-five years or more by him and his contemporaries in that country, and in Scotland. It was such an effective loom that it was not superseded for many years thereafter by other power looms, and some of its basic principles are still adhered to in American looms of today.

While connected with The Taunton Cotton Mill, the name under which the "Green Mill" operated, Shepard also carried on a machine shop on his own account, where, in all probability, he built cotton machinery and conducted his mechanical experiments.

In 1820 he disposed of his interests in the Taunton Cotton Mill and became the manager of the Hopewell Cotton Mill, which had been erected in 1817 or 1818, in Taunton, by Charles Richmond, and he continued in that position until 1827 when he bought a water privilege and land in the northwestern part of the town, where he erected a cotton mill, which he owned and managed until his death.

The Taunton Cotton Mill was acquired by the Taunton Mfg. Co. in 1828, the latter corporation having built a large brick mill on a privilege next above the former's plant, and which was erected for the purpose of bleaching and printing cloth.

The success of this enterprise had been so marked as to require more facilities and the "Green Mill" was acquired. Five years later the Taunton Mfg. Co. decided to discontinue the bleachery and print-works, and sold both plants to the Bristol Print Works, which was chartered February 20, 1833, and which operated both units until 1847. On April 23 of that year, the old Taunton Cotton Mill was sold to the Taunton Paper Mfg. Co., which for more than twenty years thereafter used the plant as a bleachery for its paper, and which, on October 25, 1867, disposed of it to the Taunton Copper Mfg. Co. The latter concern soon removed the building.

The old "Green Mill" deserves a lasting place in history because it was the earliest cotton plant erected in Bristol County, with the exception of the plants of Samuel Slater & Co., and of the Pawtucket Cotton and Oil Mfg. Co., previously built in that part of Rehoboth which, in 1861, was ceded to the state of Rhode Island.

But it takes rank as the pioneer textile plant in a county which

today and for many decades past has housed more cotton spindles and looms than any geographical division of comparable size in any state in the Union.

DEXTER WHEELER'S SWANSEA MILL

About 1805, Dexter Wheeler conceived the idea of spinning cotton by horse-power, and built two spinning frames, a card, and a roving and drawing frame, and operating them by horse-power produced satisfactory yarn, at his father's home, in Rehoboth. Satisfying those with whom he was later associated that a cotton factory ought to be successful he built, in Swansea, in 1806, on Lee's River, a small stream which rises in Rehoboth and flows into Mount Hope Bay, a cotton factory, which may be said to have been the forerunner of the great cotton industries of Fall River, since the largest subscriber to the original capital stock of the Fall River Mfg. Co., and the two principal promoters of the Troy Cotton and Woolen Manufactory, were the original holders of three-fourths of the equity in the Swansea enterprise.

Dexter and Nathaniel Wheeler, Sebray Lawton, and Oliver Chace were the sponsors of the Swansea factory, and the latter managed its affairs for seven years. The plant was equipped with between 200 and 300 spindles. In 1809, Dexter Wheeler became identified with one of the cotton enterprises in Rehoboth, but believing that greater potentialities existed in the unlimited water power at Fall River, he became interested in the Fall River Mfg. Co. in 1813.

In the History of Swansea, compiled and edited by Otis Olney Wright, in 1917, the statement is made that: "Mr. Wheeler was principal in the oversight in building the mill and dam. He also built all the machinery for spinning and operated the mill. He was one of those rare geniuses who could build a mill and the machinery to manufacture cotton cloth, and operate it. In this mill the first yarn was spun, the first cotton-picker built, and the first yard of cotton woven in said town by water power—all with the exception of the looms (which were made by Wheaton Bailey and John Orswell) were made by Mr. Wheeler. He with his workmen forged his machinery by the use of a triphammer in a shop near where the Granite Block now stands." From this evidence it would seem that all the manufacturing operations in producing cotton cloth were carried on in Swansea in a plant equipped with water-power, somewhere between 1806 and 1810.

In 1814 the Wheeler enterprise was incorporated as the Swansea Cotton Mfg. Co. The mill was burned on June 23, 1858, and never rebuilt.

THE FITCHBURG COTTON MFG. CORPORATION

In 1807, Charles Robbins, of New Ipswich, N. H., in which town he erected the town's first cotton mill, sold his interest there, and removed to Fitchburg where he was engaged in making patterns and superintending the erection of a cotton factory, then in process of construction. Probably this was the enterprise launched by Edward Kimball, Jr., who built a new dam and a brick cotton mill, 60 by 30 feet, on the north branch of the Nashua River. That same year the Fitchburg Cotton Manufactory Corporation was chartered by the Legislature, with an authorized capital of $50,000 real and $100,000 personal estate, and it is evident that this concern erected another mill, 50 by 30 feet, three stories high, with a basement. On September 17, 1817, due to the financial depression of the period, the plant was sold to Daniel Putnam, of Fitchburg, and he and

Francis Perkins equipped it with woolen machinery and operated it until the spring of 1822 when they sold the business to Messrs. Towne & Willis. In 1834, the mill was enlarged by an addition of 40 feet by 38 feet, and between then and 1864 various changes in ownership occurred. In the latter year the business was incorporated as the Fitchburg Woolen Mill Co., and two years later another extension was made to the plant, giving it a length of 132 feet.

It was on June 20, 1867, that Rodney Wallace, a native of New Ipswich, N. H., acquired an interest in the concern.

Early thrown on his own resources, at twelve years of age, he began work with a farmer, for his board and $40 a year; and at eighteen, he obtained employment as a driver of a heavy baggage-wagon, used for the transportation of freight. At twenty, he became a traveling agent for Dr. Jewett's medicines, remaining at that work for ten years, when, having saved a little money, he went to Fitchburg and entered partnership with Stephen Shepley, in selling paper, cotton waste, books and stationery. In 1859 the concern became known as R. Wallace & Company, and six years later the business was divided, Mr. Wallace taking the department of cotton waste, in which he continued until his death, and which is still carried on in Fitchburg as the Rodney Wallace Co.

The mill and other real estate of the concern was sold on May 15, 1886, to the Parkhill Mfg. Co., which had been organized in 1882, when it succeeded the firm of John Parkhill & Company, formed in the autumn of 1879, and engaged in the manufacture of ginghams.

No doubt John Parkhill experienced a thrill of pride in recalling the fact that the manufacture of cotton, established at the original plant, seventy-nine years before, and superseded after some fifteen years by woolen production, should be resumed by him, in a mill which still contained a part of the pioneer structure. The history of the Parkhill unit is treated at length in the chapter of this work covering the industries of Fitchburg.

THE WHITTENTON MANUFACTURING CO.

In 1670, James Leonard set up in Taunton an iron forge on the same privilege now owned by the Whittenton Mfg. Co., and in 1807 the spinning of cotton was begun at that site, when a factory was erected for that purpose. Consequently, for a century and a quarter cotton manufacture of some kind has been carried on there without interruption to the present date— a record approached by few textile units in the state.

The first mill was destroyed by fire November 9, 1811, but immediately there was erected a cotton factory on the same site, 70 by 30 feet, three stories high, with an attic in which the mules were installed. By the close of the War of 1812 it was known as the Whittenton Mill, and was equipped with 800 spindles. In 1818, power looms were installed and five years later the plant was sold to the Taunton Mfg. Co. In 1831-2 a stone mill was erected a short distance east of the old mill, the new unit being 50 by 34 feet, and three stories high. It was devoted to weaving fine cotton fabrics. The old mill, built in 1811, was burned January 25, 1839, and a new building erected on its site, while in 1840 the stone mill was enlarged to twice its former dimensions.

In 1836, Willard Lovering became the managing agent, and also acquired an interest in the mills, and following the financial troubles of the concern in the tidal wave of 1857, Charles L. Lovering, son of Willard, purchased the franchise of the Whittenton concern on September 24, 1858.

The business was incorporated January 1, 1883, and under the administration of the Lovering family the plant grew to include upwards of twenty buildings, ranging from two to four stories high, of brick or stone.

Now 123 years old, the Whittenton Mfg. Co. has capital of $2,600,000, and is equipped with 122 cards, 396 broad and 1,034 narrow looms, 45,840 ring and 1,864 twist spindles, 15 boilers, and complete dyeing, bleaching and finishing departments, and employs 1,100 operatives. Arthur Lyman is president, Ronald T. Lyman, treasurer, and F. H. Gooch, agent; and blankets, Jacquard robes and ginghams constitute the products.

THE NORFOLK COTTON MANUFACTORY, OF DEDHAM

In 1807 the third cotton factory erected in Norfolk County was built at the upper dam on Mother Brook, in Dedham, being preceded by the one started in Canton, in 1803, and a second one built in Medway, in 1805.

Samuel Lowder, Calvin Whiting, Jonathan Richards, Jonathan Avery, Eliphalet Baker, Jr., Reuben and Calvin Guild, Reuben Richards, William Howe, Pliny Bingham, Calvin Howe, Edward Dowse, Jesse Wheaton, and others, received a charter under the name of the Norfolk Cotton Manufactory "to manufacture cotton in its various branches," and to hold realty valued at $20,000, exclusive of the mills, and $100,000 in personalty.

The factory was of wood, the power being supplied at the outset by a tub-wheel, but a breast-wheel was soon substituted. Cotton yarns were spun at first, followed by the manufacture of cloth on hand-looms, and in 1812 woolen fabrics and satinets were produced in the plant.

This enterprise, like many another of the period, was conceived with a desire to be helpful to the youthful nation, but without due regard to ultimate success. The list of thirty incorporators, made up of local merchants, farmers, blacksmiths, hatters, a lawyer, a physician, and an innkeeper, did not include a person who possessed even the slightest knowledge of or skill in the textile art.

A somewhat unique organization was created, which provided that the company's operations should be carried on by a directorate made up of three of the incorporators, rather than by securing an active and resident agent who was versed in cotton textile manufacture.

A crudely made cotton-picker was installed in the plant, which produced such a buzzing and noisy sound that when first placed in operation it sent forth such a din that it alarmed the denizens of the courthouse village.

For a few years the concern was successful, and the annual meetings of the stockholders appear to have been occasions marked by festivities. The corporation then stood in high esteem among the citizens, but the close of the War of 1812, left it with $20,000 worth of finished fabrics on hand, which it was forced to market at ruinous prices, and with uncollected accounts of goods delivered to customers in eight or ten states, aggregating $40,000. Before the power loom and the double speeder could come to the rescue of the dying concern, it was deemed expedient to sell, and in 1819 Benjamin Bussey bought the mill at a figure far below what it cost to build and equip.

This enterprise marked the advent of cotton manufacturing upon Mother Brook, and was practically the first use of the stream for extensive manufactures, other than to supply the local needs of the townspeople for grist and saw mills.

THE BLACKSTONE MFG. CO., OF MENDON

James Beaumont, of Canton, is authority for the statement, in his reminiscenes, that John Blackbourne, who came over from England about 1802-3, and commenced building the Tyler Mill, at Pawtucket, R. I., and whom Beaumont asserts was "the most efficient and skillful machinist then in the Union, and particularly well versed in that kind of machine called throstle frames, which he (Blackbourne) described as being a great improvement over Arkwright's first inventions, both for cheapness and despatch of work," became so dissatisfied with Samuel Slater's policy of private locks, bolts and guards, that he went to Mendon, where he built the largest cotton factory then in the United States, and that it became very prosperous.

In no history of Mendon, or of Worcester County, that the author of this work has examined, can a line be found covering the arrival in that town of Blackbourne, and probably Beaumont confused him with the John Blackbourne (no doubt the same identical person) who became one of the six partners in the cotton enterprise that was launched at Medway, in 1805.

However, in that part of Mendon which, since its incorporation as a separate town, in 1845, has been known as Blackstone, Seth Wheaton, a Providence, R. I., merchant, erected in 1808 what at that period was one of the largest factories for the spinning of cotton that had been built up to that time, and perhaps the largest. It was a stone mill, 211 feet long, 40 feet wide, and six stories high, and had a capacity of 10,000 spindles, and the enterprise took the name of the Blackstone Manufacturing Company. It began operations in November, 1809, with 5,000 spindles—a larger number than was operated at that time by any other concern in the country save two—Almy, Brown & Slater, at Slatersville, R. I., and the Union Mfg. Co., of Baltimore, Md.

Despite this unusual spindlage no evidence has been found to indicate that at the outset it was more than a spinning proposition. In 1823, the plant was equipped with 150 power looms, and had 6,000 spindles, as well as bleach and dye houses. The original factory stood until 1904-05, when it, and four other mills erected there between 1841 and 1854, were torn down, and the present Blackstone Mill, of the Lonsdale Company, was erected. While most of the mill village of this concern is located within the geographical limits of the town of Blackstone, in this Commonwealth, the plant itself, including the mill, power house, store house, etc., are in the town of North Smithfield, R. I. The Lonsdale Co., however, receives all its mail, freight and express matter, in Blackstone.

In 1808, a cotton factory was established in Douglas, in Worcester County, and between 1800 and 1810 a woolen factory was erected in Sandwich, where carding and cloth dressing were carried on until 1830, when the mill was torn down.

The same year, Ephraim Hartwell and John Brown, as partners, erected a cotton factory, 100 by 30 feet, three stories high, in Watertown, and when, in 1813, Ephraim H. Bellows, a nephew of Hartwell, acquired a third interest in the enterprise, he paid $6,000 to enter the partnership, the name of which was changed to Hartwell, Brown & Co. The plant was afterwards bought by Thomas Lord & Co., of Boston, and in 1833 this concern sold it to James Derby, a manufacturer of cotton and woolen machinery. The following year it passed to the Damon Mfg. Co.

THE REHOBOTH UNION MFG. CO., OF REHOBOTH

The Rehoboth Union Manufacturing Co. was formed August 24, 1809, by Richard Goff, Dexter Wheeler, and Stephen, Thomas, James and Peter Carpenter, erecting its factory that year, equipping it with 360 spindles, and employing 14 operatives, in the manufacture of cotton yarn, which was colored in the dye-house owned by the concern. The first raw cotton consumed at the plant was transported from Boston, a distance of forty miles, by ox-team; after being spun and dyed it was sold to hand-weavers, to be converted into cloth. In November, 1835, the company's assets were sold to Nelson and Darius Goff, who manufactured cotton batting. Four years later E. A. Brown purchased the interest of Nelson Goff, and the firm of Goff & Brown added ball and carpet twine to the products. In March, 1846, the wadding mill located a little further up the stream, and which the Goffs had built, was burned, and Darius Goff removed to Pawtucket, R. I. Mr. Brown improved the equipment in the old mill, at large expense, and it was operated by various owners up to 1898 when it was torn down.

THE PAUL WHITIN MFG. CO.

Paul Whitin, of Northbridge, who had begun business in a country blacksmith shop, and who had developed the plant there into a manufactory of scythes and hoes, turned it into a cotton mill, in 1809—the third unit of its kind in the Blackstone Valley, north of Pawtucket, R. I. Cotton production was carried on there by the firm of Paul Whitin & Sons until 1864, when John C. Whitin took over the machinery manufacturing operations of what is now the Whitin Machine Works, and his brothers assumed the management of the cotton mills today known as the Paul Whitin Mfg. Co. It appears from such records as the author has discovered that this concern is the oldest surviving Massachusetts cotton enterprise that for four successive generations has been owned, controlled and managed by descendants of the founder.

Now 121 years old, it antedates the Slater unit, in Webster, by two years, which concern has remained in the control of the descendants of Samuel Slater, since 1811, or for a period of 119 years, and it also preceded the Plunkett unit, of Adams, by some five years. While the latter concern has remained in the control of the Plunkett family for four generations, it was not until 1829 that General William C. Plunkett became identified with its management, after the concern had been operating for about fifteen years.

The story of the Paul Whitin Mfg. Co. is carried in full in the chapter devoted to the manufactures of the towns of Worcester County.

THE POIGNAND & PLANT ENTERPRISE, OF CLINTON

Positive and complete data attaches to the experiment which was inaugurated in what was then Lancaster, and is now a part of the town of Clinton, when the saw and grist mills, originally established by John Prescott, who in 1653, settled in that part of Lancaster, later embraced within the municipal limits of the town of Clinton, were sold on August 18, 1809, by Thomas W. Lyon to David Poignand and Samuel Plant, the former's son-in-law, for $1,300. They acquired additional tracts of land from seven other grantors, and water rights from two, and, on December 13, 1809, paid Mr. Newton $11.46 to raze the old grist mill, immediately erecting on

its site a blacksmith and work-shop, in which they produced the machinery for their mill. On January 22, 1810, they paid Calvin Winter for shingling this building, and on the eighteenth of the same month they paid Newton $9 for razing the old sawmill.

On May 1, 1810, Joseph and Peter Kendall signed a contract to build for Poignand & Plant a brick mill, 57 by 38½ feet, three stories in height, and this original structure, with many additions made in the intervening years, still stands on Water Street, in Clinton.

Cotton cloth and ginghams were manufactured at "Factory Village," Lancaster (now Clinton) under one roof, and by the factory system, with power machinery, by Poignand & Plant, as early as 1813, according to records of sales and samples of the goods, which have been preserved. Many other Massachusetts factories had spun by power before Poignand & Plant began operations, and other individuals and firms had produced finished cloths without the factory system, or with only a partial development of it, but it seems to be beyond dispute the old Water Street Mill, in Clinton, was probably the first building in the world in which cotton sheetings and ginghams were manufactured under the factory system.

The War of 1812, and its accompanying embargo, proved advantageous to the firm, and, in 1813, the sheetings were sold at from forty to fifty cents a yard, and the ginghams, three-quarters of a yard wide, brought, according to quality, thirty to forty-five cents a yard. As the war continued, these prices soared, bringing greater profits to Poignand & Plant. A considerable portion of the products were manufactured on small orders directly received from the consumers. Between 1812 and 1814 the names of 28 women employees and those of six men and boys were carried on the payrolls that have been preserved.

As early as 1813 a women's boarding house, provided with twelve beds, was established and five years later one for the male employees was operated.

When the senior partner's daughter was married on February 13, 1814, she wore a wedding gown fashioned of cloth woven in her father's mill.

As the water supply was irregular on account of the dam farther up the stream, known as Rice's privilege, Poignand & Plant decided to purchase the water rights, and build another mill on the site of the Rice plant, and in order to secure fresh capital, agreed to admit David Greenough, a Boston merchant, into the partnership. At that time Poignand's share in the firm was fixed at $8,710.14; Plant's at $2,420.68, and Greenough's at $5,565.41. Ten thousand dollars were borrowed for the new mill on the note of the firm. The structure was 76 by 40 feet, two stories high, with a "porch," 16 feet long, and built of wood. Thirty-two looms were installed in it when finished, in 1819. The brick mill, at the lower privilege, contained 896 spindles, and the machine shop there was 61 by 20 feet. By 1829, the firm owned ten dwelling houses, occupied by its employees, the one in which Mr. Plant lived being of brick, built in 1823-4 and is still standing, on Main Street, in Clinton.

During the first few years of operation Poignand & Plant turned out a little over 200,000 yards of cloth annually, and on January 27, 1821, the Lancaster Cotton Mfg. Co. was incorporated by the Legislature, to succeed Poignand & Plant, the capital stock being fixed at $72,000. David Poignand was chosen president and Samuel Plant, clerk and manager.

Prior to the latter's removal to Lancaster he had acted as the United States sales agent of the woolen cloth manufacturers of Leeds, England,

and in 1808, a year before he and his father-in-law built the plant, at Lancaster, he went abroad, where he made a careful study of textile machinery. It is known that he brought back drawings of many mechanical inventions that he thought might prove useful, and he is even accused of having smuggled in parts of the machines themselves. Of natural mechanical bent, he later invented a picker, with two beaters, for cleansing cotton, and was the first to introduce an improved method of spinning by the use of circular spindle boxes. In all probability, he had returned to Boston, by the spring of 1809, as entries in his diary state that he was riding about the country that summer, inspecting water privileges near Boston. Poignand & Plant were attracted to one near Waltham, but they considered the price too high. Doubtless this was the one that Francis Cabot Lowell, and his associates, bought later.

Poignand displayed many traits of the typical Frenchman, carried a gold-headed cane, and belonged to the Old Regime. Plant was a typical Englishman, tenacious of his rights, firm almost to stubbornness and determined that the cotton factory should be the center of the community to which he and his partner should stand in a sort of paternal relation. Employed by them was Thomas W. Lyon, through whose influence and with the hope of obtaining his assistance in their projected enterprise, Poignand & Plant entered upon the daring scheme of inaugurating a cotton factory, although lacking experienced workers, to compete with the established cotton concerns of England. It was largely due to Lyon's skill as a machinist that the undertaking was a success. Combining the drawings Plant had brought from England, with the oral descriptions given by him of the machinery he had observed, Lyon, by his own intuitive ingenuity, constructed a complete outfit of machinery, surpassing, in many respects those of the foreign mills. This was accomplished in spite of the apparently unconquerable difficulty of securing the required castings. It is said he first invented the machinery for making a cop, and it is a matter of record that some seventy years later machinery built by him was in use in the Water Street Mill. He made many ingenious improvements in the original machinery installed that were worthy of being patented. About 1823, he removed to Northboro, where he built machinery for twenty years or more thereafter.

The Water Street plant has been occupied in the intervening years by various worsted and woolen concerns, and today is largely devoted to the cutting and sewing of carpetings for hotels and other buildings.

It is apparent that the Poignand & Plant mill was under construction the same year that Francis Cabot Lowell and Nathan Appleton were in England, visiting the textile centers of that country, and it is clear that production began there some three years before the Boston Manufacturing Company ran off its initial lot of cotton cloth.

THE SHARON COTTON MANUFACTURING CO., AND THE HEWINS FACTORY

James Beaumont, the Canton textile operator, is also the authority for the statement that a stone mason (name not given in his reminiscences), who worked for Beaumont & Wheatley, established a cotton factory, in Sharon, in 1813.

From the librarian of the Sharon Public Library it is learned that a clipping, preserved in an historical scrap-book at that institution, refers to the mill of the Sharon Cotton Manufacturing Co., being built, in 1809, by Darius and Gilbert Lothrop, mason and carpenter, respectively, while still another clipping gives 1811 as the date of the founding of the first

local cotton mill. Undoubtedly, the latter item refers to the cotton factory built by Joseph Hewins, in 1811.

The records of the town clerk show that Darius R. Lothrop married Fanny H. Belden, of Amherst, about July 3, 1841, and that Gilbert Lothrop married Aseneth Inman, about September 10, 1836, thus indicating pretty clearly that they continued to live in the town. Darius died there on August 18, 1841, at the age of sixty-four years, and therefore was about thirty-two years of age when the Sharon Cotton Manufacturing Co. was formed. It is to be regretted that more data cannot be discovered respecting the operations of the Messrs. Lothrop although it seems doubtful whether their enterprise was any more extensive than Beaumont's.

However, it is clear that in September, 1810, the inhabitants of the town of Sharon granted permission to Joseph Hewins to erect a dam in the road, near the residence of Samuel Hewins, and that the next year he built the first cotton factory reared in the town.

Apparently there was no connection between the Hewins and the Lothrop enterprises, and that Sharon had two cotton factories about the beginning of the second decade of the nineteenth century.

COTTON ENTERPRISES IN ATTLEBORO AND HOLDEN

On April 17, 1809, Peter Thatcher sold to Ebenezer Tyler, of Attleboro, and others, the right to erect and build a dam on Ten Mile River, in that town, and to impound sufficient water to operate a cotton "spinning mill of 1,000 spindles." That year a factory was erected, and that operations proved profitable is evidenced by the fact that by 1815, the mill was the largest of nine cotton plants then in operation in Attleboro, and was equipped with 1,400 spindles. The plant in 1820 was known as the Tyler Mfg. Co., and later became the Attleboro Mfg. Co., then J. C. Dodge & Sons and on June 1, 1854, the property passed to B. B. & R. Knight, of Providence, R. I., and at that time the main mill was 210 feet long, 32 feet wide, three stories high, with a one story addition, twelve feet wide extending the entire length of the structure on the rear.

In 1856 the Messrs. Knight built a stone structure 56 by 38, of two stories, which was used for cotton lapping, for the repair of machinery and for a new water-wheel. Ten years later the old mill was remodeled, making the building of uniform width in all three stories, the old roof being removed and the former attic becoming a fourth story, and 60 feet were added, making the structure 270 feet in length. In 1870 an addition 60 by 40 and four stories in the form of an ell was added at the rear of the mill, and two years later, another 100 by 42 feet, four stories high, was built.

In after years other buildings were added, one being 100 by 42, four stories high, another 90 by 56 feet, one story high, a third, built in 1876, 210 by 40, one story high, while 104 tenements were erected by the concern.

This unit, another in the adjoining village of Hebronville, and one in Providence, R. I., were incorporated in 1871, as the Hebron Manufacturing Co.

In 1809, in the village of Unionville, in Holden, Eleazer Rider & Son built a factory, and engaged in spinning cotton yarn, adding power looms in 1822, when they began the manufacture of cotton cloth.

THE INFLUENCE OF THE EMBARGO OF 1807-8

The evil effects of the embargo of 1807-8 were in some degree counterbalanced by the stimulation it gave to manufactures.

Its influence is well illustrated by the fact that prior to its enactment there were in all the United States but fifteen cotton mills, with 8,000 spindles, while at the end of 1809 there were eighty-seven, of which total sixty-two were in operation, with 31,000 spindles.[1]

Many more were in process of erection, and the prospect of industrial prosperity stimulated speculation. The War of 1812 but added to these causes, and the first half of the second decade of the nineteenth century witnessed many establishments rise, only to go down ere the advent of the year 1820.

THE WALTHAM COTTON & WOOL FACTORY CO.

In all probability much of the confusion in connection with what constituted the first cotton enterprise in Waltham arises from the fact there were two separate and distinct attempts to manufacure cotton cloth in the town, during the decade from 1810 to 1820.

The plant of the Waltham Cotton & Wool Factory Co., was erected and the concern began operations, in 1810. The cotton unit was equipped with 2,000 spindles, and utilized 300 pounds of cotton a day. The woolen unit had 380 spindles, four jennies, and two jacks and spun 60 pounds a day. Fourteen looms were kept in constant operation.

Probably upon an average, 10,000 yards of cloth were made every month, though a considerable portion of the weaving was done in neighboring and distant towns. More than two hundred persons were employed, about 150 of whom, chiefly women and children, were engaged in spinning, weaving and dyeing.

The factory was of wood, four stories high, and there were four dwelling houses, a large store and warehouse, dye-house, grist mill, mechanics' shop, woolen factory and weavers' and school houses.

The company acquired the fulling mill and water privilege owned by Gov. Christopher Gore, and undoubtedly at the time of the purchase the group was an unincorporated body.

Walter F. Starbuck, in his "Picturesque Features of the History of Waltham," points out that on October 12, 1812, the Waltham Cotton and Wool Factory Company was incorporated, and took over the Gov. Christopher Gore fulling mill, using it for finishing bleached goods. "A large four-story wooden building for the manufacture of cotton cloth was built, in 1810, and operations were begun in the same year," writes Starbuck.

The deduction from these statements is that as early as 1810 a group established itself on the Gore privilege and two years later it became an incorporated body, but, in the meantime, it seems that cotton cloth of some description had been manufactured there for about two years before the incorporation of the company.

In February, 1819, the entire property owned by the Waltham Cotton and Wool Factory Co., was purchased by the Boston Manufacturing Company.

THE HOUSATONIC MFG. CO.

John B. Root and Richard S. Chappell of Pittsfield, formed the firm of Root & Chappell, in 1810, and erected there a wooden mill, 75 by 35 feet,

1.—Hildreth's History of the U. S., Vol. I, P. 210.

four stories high, with a basement next the bank of the river, for the manufacture of cotton and woolen fabrics, the concern taking the name of the Housatonic Woolen Factory later that year. The plant was completely and thoroughly equipped, not only spinning cotton yarns and making them into warps, but producing woolen cloths, and having machinery for fulling, dyeing, dressing and finishing fabrics. In 1812 the concern was incorporated under the name of the Housatonic Manufacturing Co., but four years later the plant was offered for sale, with no buyers. At that time it had four throstle frames, containing 240 cotton spindles, and three double carding machines, three spinning-jennies, 140 woolen spindles, one roping jack, a picker, four broad looms, and three narrow looms, in the woolen department.

THE NORTH BELLINGHAM COTTON FACTORY

In 1810, Dr. Nathaniel Miller, a graduate of Bowdoin College, and of the Harvard Medical School, headed a group of Bellingham citizens, who built in the village of North Bellingham, a cotton factory, the construction work being done by Joseph Ray, of Blackstone, who had erected many cotton mills in the Blackstone Valley, and who was a member of the firm of Paine & Ray, which was then engaged in the manufacture of cotton mill machinery. In 1813 one-eighth of the corporation's property was sold to Samuel Penniman, and others, of South Milford, who built a factory in that village. The North Bellingham plant was burned in 1838, but was rebuilt.

THE PALMER'S RIVER MFG. CO.

In 1810 Asa Bullock, and a group of Rehoboth, Bristol and Providence men acquired the Palmer's River mill privilege, in Rehoboth, formed the Palmer's River Manufacturing Co., on September 20, and erected a cotton factory, which began operations the following year, manufacturing number twelve yarn, which was placed in the homes of vicinity residents to be woven by hand into fabrics. Later, the mill was leased to Nathan Sweetland and in 1822 was sold to Nathaniel and Ebenezer Ide, of Attleboro, who manufactured cloth there. In 1825 the Rehoboth Woolen Co. was formed and bought the property, and erected a dye house, but the following year the Orleans Cotton Mfg. Co. was established, introduced spinning mules and made fine goods for calico printing. When the original plant was destroyed by fire in 1831 a stone mill 72 by 40 feet, two stories high, with attic and basement, was erected and 60 looms were installed. Many owners and lessees operated the new mill up to the time the plant was burned on March 5, 1884.

UXBRIDGE VENTURES INTO THE WOOLEN AND COTTON FIELDS

In 1810, Daniel Day erected a two story factory, 20 by 40 feet, on the water power privilege now occupied by S. F. Scott & Sons, at Elmdale, in Uxbridge, and began the manufacture of woolens, enlarging the plant the following year. Day's original equipment consisted of a carding machine and a picker designed to card rolls for home manufacture, these machines being built by Artemas Dryden, of Holden, and, in 1811, a billy and a jenny, with thirty spindles, built by Arthur Scholfield, were installed. All the weaving during the early years of the enterprise was done on handlooms, set up in the homes, and Day's employees worked 68 or more hours per week. In 1825, the mill was enlarged, a canal built from West River, and power looms were installed by Day.

In 1810, a mill was erected in the village later known as Rogersonville, by Benjamin Clapp, the factory being located on the Mumford River, at North Uxbridge. Here the first cotton goods ever made in Uxbridge, were produced. In 1817, Robert Rogerson bought the plant, raised the dam and erected a factory, known as the West Mill, in 1823, and another, the East Mill, in 1827.

THE STURBRIDGE MFG. CO. AND THE GLOBE MILL

In 1811, the grist mill owned by Moses Fisk, in the village of Westville, in Sturbridge, was acquired by the Sturbridge Manufacturing Co., which established the first cotton mill in that section of Worcester County, and in which 128 spindles were installed. The Westville Mfg. Co. took over the property in 1833.

In 1811, Col. Joseph Durfee organized the Globe Mill, and built a small one-story mill, in what was then the village of Fall River, in the town of Troy, where he produced cotton yarn. The story of this enterprise is carried in the chapter devoted to the industries of the city of Fall River.

COTTON ENTERPRISES STARTED IN ASHLAND AND FRAMINGHAM

On January 23, 1811, Samuel Valentine, Jr., Aaron Eames, Elias Grout, Fisher Metcalf, and others, bought of Samuel Clark the fulling mill property, at the falls on the Hopkinton River, where Ashland center is now situated, and conveyed the property to the Middlesex Mfg. Co., which at once erected a cotton factory, that continued its activities until 1828, but it does not appear that any operations other than the spinning of cotton yarn, were carried on at the plant.

As early as 1811, Hopestill Leland, and Col. Calvin Sawyer, both of Sherborn, with Calvin Sanger, Aaron Leland, Joseph Sanger, Leonard Dearth, Benjamin Wheeler, Luther Belknap, Hopestill Leland, Jr., Comfort Walker, Moses Adams, Lewis Wheeler, Micah Adams, Joseph L. Richardson, Phillips Clark and Elias Whiting, purchased a water privilege on Cochituate Brook, in Saxonville, and erected a cotton mill, which, on February 6, 1813, was bought by the Framingham Manufacturing Co., that had been incorporated with power to hold real estate to the value of $30,000 and personal estate to the value of $50,000, for the purpose of manufacturing cotton and wool. Large additions to the land holdings were made the next year, and the concern started operations with energy, gathering a considerable number of families having children old enough to work in a mill, opened a company store, and, according to a local historian, "did a large, though not profitable, business for a number of years." The factory was destroyed by fire in 1834.

TEXTILE MILLS BUILT IN EAST DOUGLAS AND NORTH BILLERICA

In November 1811, Richard Olney purchased land on the bank of the Mumford River, in East Douglas, organized the firm of Richard Olney & Co., and built a cotton spinning mill, which later became the Douglas Cotton Mfg. Co. Six years later (1817) Mr. Olney erected another mill, in the same town.

In 1811, Francis Faulkner removed to North Billerica from Acton, founded the Faulkner Mills, and began the manufacture of woolens. He purchased of the Canal Co. a secondary water privilege, and in 1853, Charles P. and Thomas Talbot sold to him the site and power facilities they had bought of Nathaniel Stevens, in 1844, upon which he located the

present mills. He was succeeded by his sons, who carried on business under the name of J. R. Faulkner & Co., and later his grandson, Richard Faulkner, assumed the management.

The assets and factory were purchased by the North Billerica Co. in 1914, which still manufactures woolen goods there, and for 119 years operations have been carried on continuously.

MANY ENTERPRISES WERE STARTED IN 1811 AND 1812

Cotton spinning by power and the manufacture of cotton cloth on hand looms was begun at Factory Village, in Ashburnham, as early as 1811 or 1812, Samuel Dunster owning three-fourths, and Roger Chandler, of Mason, N. H., the remaining fourth, of the first factory, which was operated by different owners until its loss by fire, in 1846.

Messrs. Penniman, Scammell & Co., purchased, in 1812, for $1,200, land on both sides of the turnpike from Mendon to Boston, and on both banks of the Charles River, "for a manufactory now building," together with the right of flowage, and in 1814 the Bellingham Woolen and Cotton Manufactory was incorporated, with capital of $15,000, and a factory erected in the village of South Milford.

A sale of the company's shares in 1823 indicated a value of $8,000, and another four years later of $10,300.

The mill was burned in 1868 but the ruins of the three story stone factory still stand with about half of the walls remaining, while two fair-sized elm trees tower skyward from the center of the old structure, standing like mute sentinels over the grave of a pioneer cotton textile plant.

In 1811, Samuel Wing, and others, were given permission by the inhabitants of the town of Sandwich, to erect a dam and to build a cotton factory, between the upper and lower ponds, in Sandwich Village and the following year the plant was erected. It was operated for many years, various types of manufacturing superseding the original cotton production, and was burned in 1883.

The James River Cotton Mfg. Co. was established, at Kingston, in 1812.

THE STEVENS LINEN CO., OF DUDLEY

The present-day Stevens Linen Company, of Dudley, rose out of the embargo of 1809 and the subsequent events which led to the second war with England, being established as the Dudley Mill Co., in 1812, where operations were carried on under various managements until 1846 when H. H. Stevens purchased the property, and it was incorporated under its present name.

It now has capital of $1,050,000, is equipped with 750 looms, 8,300 spindles, and a modern bleachery, and employs upwards of 700 operatives.

In 1928, a large addition, costing upwards of $100,000 was made, and 100 additional looms were installed. Nathaniel Stevens is president, and William T. Dowling is treasurer of the corporation, which maintains its Boston office, at 78 Chauncy Street.

THE DEAN COTTON MILL, OF TAUNTON

In May, 1812, a joint stock company was organized by Robert Dean, Jesse Hartshorn, Joseph Dean, Jr., William Strobridge, and Caleb Turner, with capital of $16,000 to erect a mill at Barehole Neck, in Taunton, for manufacturing cotton yarn, and which became known as the Dean Cotton Mill. The factory was 50 feet long, and two stories high, and dwellings and a store were also built.

About 1820 twenty of the Slater power looms were installed in the plant.

SAMUEL SLATER'S VENTURE AT WEBSTER

Cotton manufacturing had increased to such an extent in the Pawtucket Valley by 1811 that Samuel Slater sought further outlets for the yarns that were spun, and believing that virgin territory should be invaded he conferred with two employees of his Pawtucket enterprise, who directed his attention to the apparently unlimited potential water power available at what was then designated as Oxford South Gore, and which later became a part of the town of Webster. Visiting the locality, he was impressed, purchased a large tract of land, acquired control of the water power privilege, and, with Bela Tiffany, one of the two workers who had urged him to inspect the locality, formed the firm of Slater & Tiffany, and erected in 1812, a cotton factory, which was the nucleus of the present extensive industrial development, at East Webster, and the predecessor of S. Slater & Sons, Inc. In 1818, he became the sole owner of the business, having in the meantime built adjacent to the cotton factory, a small woolen mill for the manufacture of broadcloths, which he, and Edward Howard, an Englishman, operated from 1815 to 1820, when the plant was destroyed by fire. The firm then acquired a water privilege at the South Village, in Webster, erected mills, and operated the plant until 1829, when Slater bought Howard's interest, and formed the firm of Samuel Slater & Sons, which was composed of himself, and George B., John and Horatio N. Slater.

PIONEER CHELMSFORD AND FALL RIVER CONCERNS

In 1813, Capt. Phineas Whiting and Maj. Josiah Fletcher built a wooden cotton factory, at a cost of $3,000, located at Wamesit Falls, on the Concord River and on the site where the Middlesex Mills were later erected. Here they began the manufacture of cotton goods. A similar enterprise sponsored by John Golding, of Chelmsford, failed at about the same period.

The Whiting factory and water power were bought by Thomas Hurd, in 1818, who erected a brick mill, installed fifty looms, and began the manufacture of woolens.

In 1813, the Troy Manufacturing Company, which later became the Troy Cotton and Woolen Manufactory, was promoted in Fall River, by Oliver Chace, and was incorporated with $50,000 capital, the original plant, in which cotton yarn was spun, being equipped with 2,000 spindles.

The same year, the Fall River Manufactory, with capital of $40,000, was established by a group of citizens of that town, headed by David Anthony, and 1,500 spindles were installed in the original mill.

The stories of the development of this concern and that of the 117 years-old Troy Cotton and Woolen Manufactory are carried in the chapter of this work in which the enterprises of Fall River are covered.

In 1813 the Union Cotton Factory—the fourth textile mill erected in Fall River—was established by Edward Estes and others, in a small building in that town, which stood on the site of the present Laurel Lake Mills, in what at that period was the village of Tiverton. The plant was destroyed by fire in 1838.

In 1813 the Bellingham Cotton and Woolen Mfg. Co., with capital of $15,000, and sponsored by Joseph Fairbanks and six others, erected a stone cotton mill, on the Charles River, at North Bellingham, which was

bought by Joseph Underwood and Benjamin Drake, in 1822, and sold by them two years later to the Washington Bed Tick Co. The mill was burned in 1828, but at once rebuilt, and later was owned by the Ray Woolen Co., of Franklin, and was operated as a woolen plant. The original factory, built in 1813, was the second textile unit erected in Bellingham.

OTHER COTTON FACTORIES BUILT IN 1813

Cotton mills were built at Plympton and Enfield, in 1813, and the Franklin Manufacturing Co. was established at Franklin, that year, to manufacture cotton goods.

In 1813, in the village of South Royalston, in the town of Royalston, the factory of the Royalston Cotton & Wool Mfg. Co. was built. Destroyed by fire twenty years later a stone mill was erected, which was burned in 1892, but was replaced by a new plant that was acquired by the American Woolen Co. in 1908 and soon after enlarged.

SOME OF THE MILLS ERECTED IN 1814

In 1814, a mill was built at Shattuckville, in Colrain, and the manufacture of cotton fabrics was begun in a small way by Warren P. King, Isaac Johnson, and others. It appears to have been the first cotton textile enterprise started in Franklin County, and the plant was the nucleus of what later became the Shattuck Mill, owned in the nineties by Messrs. Canedy & Field.

Dexter Ballou began to spin cotton in Fall River, in 1814, the factory later becoming known as the Lyman Mill.

In 1814 the Northboro Mfg. Co. was formed in Northboro, and a factory erected costing $30,000, which turned out 387,000 yards of cotton cloth annually. The mill was burned, in 1860, but was rebuilt six years later, and woolen blankets were produced.

In 1814, Capt. Adin Holbrook, of Keene, N. H., removed to Athol, organized the Athol Manufacturing Co., developed the water power now utilized by the L. S. Starrett Co., of that town, and began the manufacture of cotton cloth. Through many vicissitudes this industry continued in Athol for almost ninety years, and for a third of the period was the outstanding type of production there.

On February 18, 1814, the Pittsfield Woolen and Cotton Factory, one of the pioneer textile enterprises of Berkshire County, was incorporated by the Legislature, with Lemuel Pomeroy, Joseph Merrick, Ebenezer Center, Samuel D. Colt, David Campbell, and others, as the sponsors, and with capital of $130,000.

In 1814, the Rivulet Mill was built at Uxbridge, on the site of the present factory that bears that name, and here the second attempt to manufacture woolen goods in that town, was undertaken. The promoters drove as far as Vermont to buy loads of wool, and then packed the fruits of the loom on sleds or wagons, and drove to Providence, R. I., to find a market for the finished product. John and George Carpenter built a billy and a jenny for the Rivulet Mill, and John Capron who controlled the water rights on the Mumford River at that period, was engaged in dyeing and finishing the woolen cloth woven by the families living in Uxbridge.

THE WEST BOYLSTON MFG. CO.

On February 3, 1814, the General Court of the Commonwealth granted a charter to the West Boylston Manufacturing Company, and gave it

the right to engage in the "manufacture of cotton and woolen cloths, and fine wire." The new concern never took advantage of its corporate right to engage in wire production, but throughout its continuous operations covering a period of 116 years, has devoted its facilities to the production of specialty lines, either in cotton or woolen.

The original factory, a small wooden structure, was built in what was then called White's Village, in the town of West Boylston, the location later being known as Oakdale. This building was destroyed by fire, about 1839, and a new brick mill was erected, which was occupied until 1900, when the company's real estate was acquired by the Commonwealth for the Wachusett Reservoir, which at that time was under construction at Clinton, to provide additional resources for the Metropolitan water supply.

But the Commonwealth, which eighty-six years before had incorporated this still virile textile unit, was not to be the agency to discontinue its operations, and the officers of the company began looking about for a new location, and were attracted by the advantages possessed by the idle Williston Mills, in Easthampton, which were purchased and remodeled. In 1900 the removal was made from West Boylston and in the intervening years many additions have been made at the Easthampton plant, an extensive housing development undertaken, and a magnificent community house erected there for the use of the company's employes and their families.

The Easthampton plant was completely equipped with modern machinery, at the time of removal and today the company is producing fabrics and cords for bicycle and automobile tires, for the rubber industry, filter fabrics for the sugar, paint and oil trades, and drapery and upholstery for the textile markets.

In 1927, the company transferred 32,256 of its Easthampton spindles, with complementary machinery, to Montgomery, Ala., where a new mill and tenement village were built. The new unit is known as the West Boylston Mfg. Company of Alabama, and is operating entirely on cords and cord fabrics for the tire trade.

The Easthampton plant is equipped with 105,248 ring spindles, 900 looms, and thirteen boilers, and employs 1,700 operatives, making the concern by far the largest unit in the town.

It has capital of $2,186,000 and the officers are, F. Coit Johnson, president; Acosta Nichols, vice president; G. Arthur Cook, treasurer; Joseph I. Gaskill, secretary and clerk. The officers of the West Boylston Mfg. Company of Alabama, are Stuart H. Johnson, president; G. Arthur Cook, treasurer, and Carl M. Moore, assistant treasurer and agent.

W. C. PLUNKETT & SONS CO.

The present-day W. C. Plunkett & Sons Co., of Adams, dates its original production from as early a period as The Boston Manufacturing Co., and of all the pioneer cotton enterprises it is one of three Massachusetts concerns where continuous operations have been extended over a period of more than a century, without interruption, and by four successive generations of a single family, whose representatives have been active in its management and ownership during all of this time.

In 1814 a brick cotton factory, 75 by 32 feet, three stories in height, typical of the mill architecture of that period, was erected at Adams, the power being furnished by the rapids of the Hoosac River and the mill being built on the site of an ancient iron works.

An undershot wheel was installed, which was later replaced by a huge wooden breast wheel requiring a dam, canal and penstock to utilize the fall of nineteen feet. It appears that with the exception of this mill, and one or two others, all the cotton factories then existing were compelled to close after the peace of Ghent, in 1815, on account of the flooding of markets in the vicinity of textile establishments by British producers, who sold their goods at less than cost in order to complete the annihilation of such industries as had been started during the War of 1812.

The unit was originally called the Adams South Village Cotton and Woolen Manufacturing Co., and it was equipped at the outset with 708 spindles, and 26 looms, some thirty-one stockholders having an interest in the corporation. One of the incorporators later became an uncle by marriage of Gen. William C. Plunkett, who came to Adams at his solicitation, in 1829, to help manage the plant.

General Plunkett at that time was twenty-nine years of age, a native of Lenox, and following his graduation from Lenox Academy, he temporarily taught school in Lee and Lanesboro, where he attracted the attention of Thomas Durant, a merchant in the latter town, who, in after years, became prominent in the building and management of the Northern Pacific Railroad. Generously offering a share of the profits of his business, in 1826, to his protege, Mr. Durant had the satisfaction of observing the progress of the young merchant and his later activity in Adams, as a manufacturer where, by frugality and perseverance, he accumulated sufficient capital to purchase the entire stock of the corporation before the end of 1831.

By 1844, General Plunkett had doubled the capacity of the original factory, and just previous to the Civil War he discarded the original looms and substituted for cotton sheetings, which had been the exclusive product of the plant to that time, the manufacture of Balmoral skirts, satinet blankets, repellants, and broadcloths. In 1854 he served the Commonwealth as Lieutenant Governor.

Before the Southern ports were blockaded, and while cotton was selling at very low prices, the storehouses, barns and sheds in the vicinity of the Plunkett plant were literally bulging with what was soon found to be a precious staple, worth tenfold its original cost. From a portion of the profits, an addition, including a new dye house, was built in 1865, and Daniel Wheeler, a brother-in-law of General Plunkett, was admitted to the firm, as a partner.

In 1870, William B. Plunkett became active in the management, and in 1878, the firm of W. C. Plunkett & Sons was formed, which included Charles T. Plunkett, a younger brother, and this group operated Berkshire Mill No. 1. Upon the death of Mr. Wheeler, in 1881, his interest in the original plant was purchased by the Messrs. Plunkett, and a second mill was built the next year.

The Hoosac Street Mill was destroyed by fire on December 25, 1886, and for a time No. 2 Mill was operated day and night, until the old 1814 plant could be razed, and a new unit erected in its place.

In tearing down the old factory it was necessary to batter the walls with rams, the binding power of the cement being so great that the bricks could not be separated. In 1880 the company organized the Greylock Mills, in North Adams, of which W. B. Plunkett became agent and its early success warranted a series of enlargements. Changes were made from ginghams to fine carded plain cottons, and finally to superior combed fabrics, which are now produced in Greylock Mill A, at North Adams,

and Greylock Mill C, at North Pownal, Vt., which was purchased and entirely re-equipped in 1911, while yarns for all weaving purposes are made in Greylock Mill B, in Williamstown, which the company bought and thoroughy remodeled, the same year. These four units—at Adams, North Adams, Williamstown and North Pownal, Vt.—are today equipped with 172 cards, 121,792 spindles, 1,602 looms, and twelve boilers, and employ about 800 operatives.

The W. C. Plunkett & Sons Co. is capitalized for $400,000 and the Greylock Mill units for $1,500,000. On the death of the late Charles T. Plunkett, in 1927, his son, Charles T. Plunkett, Jr., succeeded to the presidency, with William C. Plunkett, as secretary of the corporation, and Gilbert T. Thompson, as treasurer.

In 1889, the seed planted seventy-five years before ripened into the Berkshire Cotton Mfg. Co., another Plunkett enterprise. This corporation purchased the property on which were the ruins of the Hoosac Street Mill, and there built Mill No. 1, for the production of fine counts of carded cotton, originally installing 35,000 spindles and 700 looms. In less than two years it was found that even larger quantities of goods, if made of combed yarns, could be readily marketed, and the original capital of $500,000 was increased to $950,000, and No. 2 Mill was built, equipped with 41,000 spindles and 900 looms, the structures being dedicated, in 1892, by Hon. William McKinley, of Ohio, and Lieut. Gov. William H. Haile, of Massachusetts.

Anticipating that the voters in 1896 would return a Congress that would enact a protective tariff measure, the capital stock of the corporation was increased to $1,500,000, and Mill No. 3 was erected, and equipped with 80,000 spindles, and 2,200 looms, designed for still finer goods.

Cotton was first put into the pickers of this unit on the day that William McKinley was nominated by the national convention, at St. Louis, for President of the United States, and, four years later, while the guest of Hon. W. C. Plunkett, at Adams, he laid the corner-stone of the No. 4 Mill—the largest of the group—and today one of the biggest single mills in America, containing 103,000 spindles, and 2,600 looms, the company's capital having been increased by that time to $2,500,000.

Today, the Berkshire Cotton Mfg. Co. has capital of $5,000,000, 259,-010 spindles, and 6,541 looms, 300 cards, and 23 boilers, the products being lawns, organdies, mulls and India linens, and it employs over 2,000 operatives. The difficulty of obtaining at all times a sufficient quantity of long staple cotton, in desirable grades to supply the mills, led to the investment in plantations of over 11,000 acres in the Yazoo delta, by the Berkshire Cotton Mfg. Co. and individuals, from which the choicest cottons are now received.

Up to the time of his death, on July 8, 1927, the late Charles T. Plunkett, Sr., was president of the Berkshire Cotton Mfg. Co. He was succeeded by Gen. C. H. Sherrill, Ralph H. Paige is vice president, Gilbert T. Thompson is treasurer and agent, and W. E. Stoddard is assistant treasurer and buyer, of the corporation. These two successful units serve as examples of what Massachusetts capital can accomplish in the fine cotton goods field.

In appreciation of the interest in these enterprises, which was maintained to the day of his death by the late President McKinley, a bronze statue of him was erected in McKinley Square, in Adams, in 1897, by local admirers.

The record of more than a century of solvency in a manufacturing establishment of any kind is exceedingly rare, and the W. C. Plunkett & Sons Co., which has weathered all the vicissitudes of the political, financial, economic and social storms of more than ten decades, is certainly entitled to a high place on the Massachusetts industrial roll of honor.

Its growth and that of its 41-year-old offspring—the Berkshire Cotton Mfg. Co.—from 708 spindles to 380,802, and from 26 looms to 8,143 is indicative of the continuing managerial abilities of four generations of one family.

In 1929 there was formed the Berkshire Fine Spinning Associates, Inc., a consolidation of the Berkshire Manufacturing Co., of Adams, the Greylock Mills, of North Adams, the Fort Dummer Mills, of Brattleboro, Vt., the Valley Falls Co., of Albion, R. I., and the Coventry Co., of Coventry, R. I. The new group is capitalized for $6,647,200 seven per cent convertible preferred stock, of $100 par value, and 195,854 shares of no-par common stock.

The new consolidation transacts a gross business of about $20,000,000 annually, and the plants have approximately 600,000 spindles, and 12,000 looms. The products of the individual mills are of an allied character, including lawns, organdies, mulls, dimities, India linen, and similar items.

Charles H. Sherrill is president, Gilbert T. Thompson is treasurer, Wallace E. Stoddard is assistant treasurer, H. C. Haile is secretary, and John H. McMahon is in charge of manufacturing operations.

THE BOSTON MANUFACTURING COMPANY

Newburyport really contributed to the world Francis Cabot Lowell, for it was there he was born and reared, and it is a coincidence that the germ of the great modern cotton mill of America may well be said to have been born on English soil, but in the minds of two intense American patriots—Lowell and Nathan Appleton, then both citizens of Boston,—who, casually meeting abroad, in 1811, reached the common opinion that the United States need no longer depend upon England for fabrics, but that all that were required for home consumption could be produced here if the industry were but properly developed.

Before returning to America, Lowell visited Manchester, one of the large textile centers of England, and secured all the data obtainable respecting methods and machinery, with a view to introducing the improvements of manufacture into the United States. While being permitted to inspect the machinery in use in the mills, he was unable to secure any drawings, but he came away with some definite ideas as to the construction of the devices, and immediately following his return to Boston he endeavored to translate into tangible form the fundamentals of a power loom.

Lowell also observed that in the cotton mills abroad the spinning and weaving were carried on in separate establishments, but in the mill he had in mind he planned to so arrange the manufacturing unit as to perform all the processes for the conversion of cotton into cloth within the walls of one building, and, what was still more of an innovation, they were to be accomplished by power, rather than by hand.

One of the most interesting phases of his progressiveness is that objections were raised on all sides to the effect that the project was chimerical, impossible of accomplishment, impractical and foredoomed to failure. Some members of his family used all their influence to dissuade him

from putting into effect what they considered a visionary and dangerous plan of action but he brushed all these objections aside, and on February 28, 1813, he formed the Waltham Company, purchased the Boies water power rights on the Charles, in that town, at the location called "the upper falls," and, with his brother-in-law, Patrick Tracy Jackson, subscribed the first $100,000 in stock.

Lowell saw at once that in constructing the machinery for his Waltham plant, his first need was for a practical mechanic, who could execute his designs. He heard of Paul Moody, a native of Byfield Parish, in Newbury, where he was born on May 23, 1779. Moody had gained some experience, when but sixteen years of age, on a hand loom. At the time Lowell began his venture, Moody was part owner of a small mill,—the Amesbury Manufacturing Co., of Amesbury. Inducing him to accept an offer to come with the Boston Manufacturing Co., Moody sold his interests in Amesbury, and with his family, moved to Waltham, in 1814.

Not only was it necessary to construct the machinery for the mill from the patterns Lowell had succeeded in bringing from England, pieced out by his memory and native ingenuity, but the very machines for building this new machinery had to be devised and set up. But the two men were able to conquer these difficulties. In addition to supplying a knowledge of English methods, Lowell possessed an understanding of the mathematical principles involved in the construction of machinery which, at that time, was probably unparalleled in the western hemisphere, while Moody, with a thorough acquaintance with practical mechanics, together with an almost uncanny aptitude in grasping Lowell's ideas, and an equal ingenuity in working them out, completed a combination which spelled the success of the enterprise.

Their most notable joint achievement undoubtedly was the construction of the power loom. Lowell had been unable to obtain any knowledge in England of this invention, then just coming into general use there, and he was obliged to work out a pattern, with Moody's coöperation, in a little shop in Boston.

Lowell informed Moody that the Waltham plant must have "a governor to regulate the speed of the wheels." The mechanic had never heard of such a device, and all Lowell could tell him was that he recalled seeing one in England, and that it had two iron balls suspended on two rods connected at one end. It was agreed when Moody left his Boston shop that a governor should be ordered from England, but on his ride to Waltham he could think of nothing but the device, and the following morning he chalked out a rough sketch of his idea as a model for his workmen. Shortly afterwards, Lowell went to Waltham and inquired whether the governor had been ordered from England, and received his answer by being shown Moody's apparatus, which was set up at once. It remained in service until 1832, and was the model of those used later in Lowell.

Moody's many patents on new machines for special processes became permanently incorporated in what was known as the "Waltham System" of textile machinery, and prepared the way for later inventions and improvements. He developed a large business in supplying other cotton mills, which began to spring up throughout the state.

After many experiments a practical loom was completed by Messrs. Lowell and Moody and installed in the fall of 1814, in the new mill at Waltham.

It was different from the English loom observed by Mr. Lowell, in

that the principal movement was by a cone revolving with an eccentric motion, that has since given place to the crank motion.

To meet the need for winding the threads from the bobbins onto the loom, Mr. Moody invented an ingenious warping and dressing machine. Imperative necessity for a bobbin and fly, or jack frame, arose for spinning roving, and Moody and Lowell invented the double speeder which required the most careful mathematical calculations.

Moody was granted a patent on December 20, 1820, on his double-speeder for roping cotton, and on January 17, 1821, another on the throstle spinning frame. On February 19, he was awarded two more patents for roping or spinning cotton, one being an improvement on his double-speeder.

Within two and a half years six new machines had been invented and operated by Messrs. Lowell and Moody:

1. The power loom.
2. The warping and dressing machine.
3. The regulator, or governor, for the water wheel.
4. The double speeder.
5. The dead spindle.
6. The Throstle filling frame.

Once completed, Lowell's power-loom showed such capacity that the full capital of $400,000 was quickly subscribed, and 3,000 spindles were installed, enabling him to turn out about 4,000 yards of heavy sheeting, 37 inches wide, weighing less than three yards to the pound, each week.

The first commodity manufactured at the plant was "a heavy sheeting of No. 14 yarn, 37 inches wide, 44 picks to the inch, weighing somewhat less than 3 yards to the pound," according to Nathan Appleton.

The initial entry in the original book in which the account of the goods manufactured was recorded, is as follows:

"1816, Feb. 2. 31 pieces:—912.2 yards, 4-4" or thirty-six inch goods.

Although the cotton industry suffered from a marked depression from 1817-20, due to the after effects of the War of 1812, the Waltham factory was uniformly successful, paying a dividend of 12 per cent annually.

From its inception to date, with only the change in corporate name to the Boston Manufacturing Company, the concern has continuously operated and it stands today with more than 116 years of service behind it—one of the oldest concerns of its kind in America.

It is capitalized for $2,100,000, employes 1,000 operatives, and now manufactures cotton ginghams and rayons. The officers are Robert Amory, president, James H. Whitehead, treasurer, and C. F. Allen, secretary.

The Willington Cotton Co. was organized in Dighton, in 1814, with $90,000 capital and was operated under various names until 1845, when the factory was burned.

In 1814, Oliver Ames, a native of Bridgewater, began the manufacture of cotton goods, in Easton, and later produced cotton machinery.

The same year the Mansfield North Cotton Mfg. Co. was formed, at Mansfield.

Just at the close of the War of 1812, the Messrs. Gleason established a sixty-spindle factory in the town of Monroe, and manufactured satinets. Probably this enterprise came into being about 1815 or 1816.

In 1815, William Arnold and others, built the Ironstone Mill, on Ironstone Brook, in Uxbridge, and engaged in the manufacture of cotton goods.

During the remainder of the decade from 1810 to 1820 many textile

concerns came into being, and their respective histories are told in other chapters of this work.

The middle of that decade really marked the end of the pioneering textile period, and from that time on concerns that had carried on a part or the whole of their manufacturing operations by hand power, turned to power looms, and in fact to all kinds of power machinery, for the doom of the hand-operated textile unit was sealed, and it could no longer successfully compete with its rivals which were equipped with power devices.

CHAPTER VII

THE INDUSTRIAL PROWESS OF THE TOWNS OF BARNSTABLE COUNTY

Following the days of the grist and fulling mills the industrial activities of the town of Barnstable were practically nil, save for the business that has been done for many years by the West Barnstable Brick Co., which represents an annual production of 2,000,000 bricks, but the town is this century experiencing a manufacturing renaissance through the production of the Colonial Candle Co., of Cape Cod, and the pearl essence of the Cape Cod United Products Co., whose yearly sales probably amount to more than those flowing from all previous manufacturing operations carried on in the town since its settlement. In addition, the Cape & Vineyard Electric Co., the small boat manufacturers, the lumber operations of John Hinckley & Co., the united cranberry production and the advent of a few small artificial pearl units, help to give Barnstable of today a higher industrial rating than it has heretofore enjoyed in all its municipal history.

A CAPE COD CHEMIST CAPITALIZES THE SCALE OF A HERRING

An industry that has exercised a profound and dominating influence in the production of artificial pearls, but one that has been accomplished in such a quiet way that its sphere of action but recently has come to public knowledge, is the result of one of the most important chemical discoveries of a Massachusetts man—Edward I. Petow, who came here from France a little over twenty years ago, and who, for a dozen years past, has been a resident of the village of Hyannis, in the town of Barnstable, where he is the head of the Cape Cod United Products Company.

For more than fifty years constant efforts were made to produce in America an essence that would enable the manufacturers in this country to market artificial pearls of the same lustre and commercial value as those imported from France and other foreign nations. Large sums of money were sunk in unsuccessful experiments, many American manufacturers having brought to this country some of the leading French chemists at enormous retainers, but after expending hundreds of thousands of dollars in attempting to develop a practical process the promoters accepted the decision of the imported experts to the effect that America was lacking in the natural resources which could be scientifically marshaled into producing the required essence.

But Mr. Petow, acting upon his own initiative, conducted over a long series of years, a continuing line of experiments, in which he utilized many species of fish until finally his patience was rewarded by locating in the fish scales on the stomach of the plebian every-day American herring the one known world source of liquid essence, which, when properly treated by a secret process of his own invention, yields a product that once applied to a common glass bead, either by the hand dipping or spray gun method, imparts not only all the silky loveliness and natural color of

the famous Oriental jewels, but produces an artificial stone that only the best of the experts and chemical analysis can detect from the genuine pearl.

Mr. Petow's discovery was made about thirteen years ago and during the period of the World War and for two years after the armistice he was the sole world producer of this essence d'Orient, as his invention is commercially known, but knowledge of his amazing discovery quickly seeped out and for eight or nine years he has been supplying American and European manufacturers with this product and with other chemicals for the manufacture of artificial pearls, and at his Hyannis factory he is also making his own reproductions of the real stones.

The interesting sequel to this discovery, which was of such moment to the artificial pearl industry, is that the market, which formerly belonged exclusively to European and Asiatic nations, is now in the hands of Americans, as Mr. Petow's essence has resulted in building up plants in this country for the production of artificial pearls of larger extent and of greater capitalization than those in any foreign country, despite the fact that abroad the industry is infinitely older. But more important still is the fact that the quality of the American pearl, as produced through the medium of Mr. Petow's essence d'Orient has been maintained at such a high level as to result in practically driving the French-made pearls out of the United States market. The beautiful pink and cream tones, so much sought after by connoisseurs of the real pearl, are so well reproduced in the artificial stones as to enable the producers of the latter to market strings of pearls for as high as $300.

In order to secure sufficient raw materials to fill the growing demand for the Petow invention, the Cape Cod United Products Company has acquired by purchase numerous streams on Cape Cod, where the runs of the lowly herring provide the nucleus of the product. Mr. Petow's claim to priority in developing the essence seems to be clear, as for years nobody has stepped forward to seize the $1,000 reward which the United Company announced some time ago would be paid to any person who could definitely prove that fish scale pearl essence had been produced in America from domestic fish scales prior to Mr. Petow's invention of 1917.

He takes high rank among America's scientific discoverers, as the chemical product he has evolved has been the biggest single factor in developing the artificial pearl industry of this country from a $50,000 annual business to one of over $50,000,000 per annum, a growth flowing solely from Mr. Petow's formula.

Despite the fact that the industry has suffered from insufficient tariff protection, the saving factor is that the American-made artificial pearl is of far better quality and not easily duplicated by the foreign producers.

In 1927, Mr. Petow spent a number of weeks in Canada in an effort to secure access to the haunts of herring in that country, as the sources in the United States are insufficient to provide the requisite quantity needed to supply the demand for the fish scale essence.

When one considers that it requires 500 pounds of scale to produce one pound of the essence it can be seen that an enormous quantity of herring must be made available for use. Then again only the scale found on the stomach of this species of fish can be utilized, the remainder of the herring becoming a by-product. Fortunately, the waste is now being put to commercial uses.

Mr. Petow's elaborate laboratory, which occupies all of the available floor space of the old Hyannis yacht club house, is an amazing place, con-

taining as it does literally myriads of retorts of all sizes and kinds, in which the liquid essence may be observed in all stages of preparation from its inception to its entry into the world markets. The magnitude of his contribution to American chemical discoveries is attested by the fact that in order to prevent the priceless secret from being seized by unscrupulous exploiters it is necessary to bar the windows and doors of the Hyannis laboratory which some time ago was broken into with the attendant loss of chemicals and materials.

THE MODERN MRS. JARLEY

Just a score of years ago, in the kitchen of a typical Cape Cod home, there was born an industry, which today gives employment to more than 100 hands, and which grew from a hand-dipped bayberry candle made by Mrs. Mabel Kimball Baker, the wife of Walter D. Baker, at that time the owner of a department store, in Hyannis.

In the days of Myles Standish and John and Priscilla Alden and for many generations thereafter all Colonial housewives made their own candles mostly from bayberries, the light green waxy fruit of a bush which spread itself pretty much over New England and grew in greatest profusion on Cape Cod.

In 1910, Mrs. Baker was surprised to receive an order from the Samuel Ward Company, of Boston, for a dozen boxes of bayberry candles, and this initial request being repeated in doubled, trebled and quadrupled quantities, her husband sold the department store in 1921 and erected a completely equipped candle factory, which today is a mecca for all visitors to the Cape, and Mrs. Baker's candles have become as internationally known as Mrs. Jarley's famous wax works.

The development of the business was primarily due to Mr. Baker's idea that a solid color hand dipped candle must be produced, and long experimentation by chemists with wax soluble pigments, and many failures and disappointments were experienced between 1908 and 1921 before the thirty-seven colors of Colonial Candles which now find their way into the markets of every state in the Union and throughout England and Canada, were evolved. The company marketed over a million candles in 1925 and with the recently increased plant capacity it now produces and sells 1,500,000 a year.

To the long list of varieties were added the slender "whip" candles, from 18 to 24 inches in length, and then the "character" products, which are moulded from white wax into charming Priscilla and John Aldens, Queen Elizabeths, Ben Franklins, and skilfully decorated by a group of artists, who, with a few deft touches, seem to bring them to life.

In August, 1927, a full carload of Colonial Candles, numbreing 172,620, and weighing twenty-five tons, was shipped from Hyannis to the Chicago headquarters of the company—undoubtedly the largest single shipment ever made by a Massachusetts candle-producing plant.

The Colonial Candle Company, of Cape Cod, is operated as a partnership by Walter D. Baker and his wife, Mrs. Mabel K. Baker.

THE INDUSTRIES OF YARMOUTH, CHATHAM, MASHPEE, EASTHAM AND HARWICH

In 1829 Elisha Jenkins operated a boat building plant and a shoe manufactory in Yarmouth, while in 1847 the Kelley family established there a rope walk, which flourished for many years. In 1848 an oil-cloth works

was set up, which later removed to Fall River and in 1854 John K. and Barnabas Sears began a planing mill business in the town.

In 1800 a tannery was set up in Chatham, which ground bark by power provided by a windmill. It was abandoned about 1830. In 1828, Joseph Young built the only block factory ever operated on the Cape. In 1819 he had set up a water mill where, two years later, he installed cards for dressing cloth, and then he turned to the making of blocks by hand. In 1847, his son entered partnership with Mr. Young and machinery was installed, operated by water power, and this innovation is thought to have been the first instance in Massachusetts where the manufacture of blocks was carried on by machinery. The business continued there for ten years thereafter, or until the factory building was removed to South Chatham. In 1856 Isaac B. Young began the manufacture of shoes, in Chatham, employing 30 hands, until operations were discontinued in 1863.

In the first quarter of the nineteenth century a rope walk was operated in the town, but today its major industrial activities are confined to the operations of the Cape Cod Windmill Co., engaged in the production of wood products, weather vanes and novelties. Several small units of a like nature have come into being in the town since the advent of the automobile, and provide tourists with useful and ornamental souvenirs, typical of old Cape Cod.

Mashpee's chief claim to industrial fame rests on the old and now extinct Mashpee Manufacturing Co., which built a plant on the Santuit River many years ago, where it was intended to produce brooms, but ere long a return was made to Cape Cod's first love—the cranberry—and the concern was one of the predecessors of the twentieth century corporations now engaged in the scientific planting, growing, harvesting, canning and marketing of this succulent fruit.

Eastham's venture into the manufacturing business was largely confined to currying, Edward Clark having begun that business in 1866 and successfully operated it until 1880. Since that time the town's main contribution to Massachusetts industry has been in the cranberry trade.

Harwich has long been active in many lines of industry. Subsequent to 1820 a carding machine, brought from North Harwich, was installed at the old water mill, which had been erected in 1763, by Thomas Burgess, and wool was carded there for several years. The tanning business was carried on by Elkanah and L. D. Nickerson, but long since disappeared locally.

Perhaps animated by a desire to be cleaner than some of her municipal neighbors there was set up in the town, in 1856, a soap factory, which flourished for a period. Up to 1857, a manufactory of doors, sash and blinds was operated. In 1865, Jonathan Buck established a plant there for the manufacture of fisherman's boots, and men's slippers, the production later including women's shoes. The concern was afterwards incorporated with $10,000 capital. In 1873 the company ceased operations, but Buck still continued along the original lines until ten years later. A barrel manufactory, designed to provide that commodity for the cranberry growers followed, and in 1866, Benjamin F. Bee established a machine shop in the town. At South Harwich, an overall factory was built in 1865, and a second venture of the same nature was undertaken in 1872, this concern producing shirts as well as overalls. Fifty employees were regularly carried on the payrolls, while 250 outside workers helped in the production.

Harwichport once boasted of a tannery and several sail lofts, while at North Harwich there were operated for many years small cotton and

woolen factories, a boiler plant, and, in 1867, a tap and die factory, which was burned the following year. Today, the town is the seat of the Old Kolony Narrow Fabric Co., capitalized for $50,000, manufacturing tapes, bindings and webbing, and employing ten operatives, and the plant of R. H. Small, producing barrels and boxes, at South Harwich, and employing twelve hands, but the factory of the United Cape Cod Cranberry Co., at North Harwich, is of greater importance than all of the town's previous industrial enterprises combined. At West Harwich, Messrs. Robbins & Everett operated a knitting factory for several years.

THE PRODUCTS OF BREWSTER, FALMOUTH, PROVINCETOWN, WELLFLEET AND ORLEANS

In 1814, Brewster had a woolen factory, which later produced cotton goods, and finally was adjusted to paper making, and about 1920 knitted products were manufactured there.

Prior to 1850 Falmouth possessed a glass works, carried on in a factory which cost $25,000 and which was operated by steam power. Joseph Bowerman, who had set up a windmill in the town, in 1787, also operated a tannery there. About 1859 Mrs. Gilbert R. Boyce began the local manufacture of tags and later James A. Boyce erected a factory where this type of production was carried on. For many years all of the stringing of tags done in Cape Cod, Martha's Vineyard and as far north as Wareham, for the Dennison Manufacturing Company of Framingham, was managed from Boyce's factory. Prior to the invention of machinery to string tags it was the policy of the Dennison concern to ship the tags and strings to various towns, where men, women and children carried on the work in their homes.

Falmouth today has a $370,000 corporation in the Cape Cod Preserving Co., manufacturers of preserves, jams and jellies, 25 employees being carried on the rolls, and another unit is operated at Wareham, in Plymouth County. William W. Phinney is engaged in yacht building, in Falmouth.

Provincetown's industrial activities are largely confined to those collateral to the fishing trade, the L. Pickert Fish Co., capitalized for $150,000 specializing in canned fish, with L. W. Pickert as president and treasurer, and E. S. Pickert, as secretary; A. W. Dodd & Co., Inc., of Gloucester, operating one of its four cod liver oil plants in Provincetown, and the Consolidated Weir Co., capitalized for $200,000, employing 50 hands in the freezing of fish and in the manufacture of artificial ice. W. Irving Atwood is president and treasurer, and George A. Cole, secretary.

In 1890, a shirt manufacturing concern began business in Provincetown, employing 200 women and at that period it was the town's leading industry.

Wellfleet is the seat of the factory of Allen, Doane & Co., Inc., capitalized for $15,000, manufacturing steel letter cutters, and employing 15 hands. Warren Doane is treasurer, and Harold M. Allen, secretary.

Joseph H. Cummings and William H. Howes, doing business as Cummings & Howes, began the manufacture of shirts, overalls and trousers, in Orleans, in 1873, and five years later erected a large factory, in which from 125 to 200 employees found work. For two and one-half years all the trousers of the Plymouth Rock Pants Co., then nationally advertised, were produced in this shop, and later the famous Bunker Hill Pants were made there. In 1885 John Wilson fostered a trousers manufacturing concern, and three years later was succeeded by George F. Snow, who

originally employed from 25 to 35 hands, and subsequently up to 100 workers.

THE FAMOUS SANDWICH GLASS WORKS

The difficulties of the passage and the distance to Plymouth, to have the town's grain ground induced Thomas Dexter to negotiate with the proprietors of Sandwich to build a mill in 1654. The project failed and "John Ellis, William Swift, William Allen and James Skiff were engaged to build a mill, the town paying £20." This sum was subscribed by twenty-two of the freemen and the plant was completed early in 1655.

Later Dexter completed his mill, and a third plant was erected in 1689, doubtless at Spring Hill. The Dexter mill did service for almost 200 years, being used until 1881. In 1717 permission was given "to sundry persons to set up a saw-mill upon the brook at Spring Hill," and in 1742 Samuel Wing was voted "the liberty to erect a grist mill on Spring-hill river."

The war of 1812 did not deter the building of a cotton factory in that year, for which enterprise the town gave its consent by vote the previous year "that Samuel Wing and others have leave to erect a dam and works of a cotton factory on the stream between the upper and lower ponds in Sandwich village, at a place near Wolf-trap Neck, so called." This was used for many years for various purposes and was burned in 1883.

Early in the 19th century a woolen factory was erected to the east of the old grist mill. Here carding and cloth dressing were carried on until 1830, when the building was razed.

Upon the same site, another structure was erected for a marble works, the sawing of the blocks of marble being performed on the ground floor, and the finishing process on the slabs being done above. This business died in 1859 or 1860. Two or three years later L. B. Nye leased the building, and carried on wheelwrighting and pounding clay for the Cape Cod Glass Works until 1871.

Levi S. Nye manufactured jewelers boxes in the building until 1876 and three years later Nye Brothers started the active business of making and printing tags, and furnished employment for quite a number of hands.

The Boston and Sandwich Glass Company was for many years the most prominent industry of the latter town. It was established by Deming Jarvis in 1825, the adjacent pine woods, of which vast tracts were purchased, being the inducement for locating the plant in Sandwich. A stock company, consisting mostly of Boston capitalists, was formed in 1826 and operated one furnace and gradually increased the equipment to four. During the years between 1861 and 1864, the business employed 500 hands in its various departments, and its products were valued at $300,000 a year. When the plant closed its doors on January 1, 1888, there were 275 men on its payrolls.

Ten of the former employees erected a building for the manufacture of glass that year, and in 1890 eight of them were operating under the name of Sandwich Co-operative Glass Company.

In 1882 Charles W. Spurr, of Boston, started veneer cutting in the building formerly occupied by the Cape Cod Glass Company, and five years later others became interested in the venture and the firm of Charles W. Spurr & Co., was created. The products consisted of veneers for cigar boxes, car work, furniture, ornamental uses and carvings for ceilings and furniture. In the autumn of 1888 the Cape Cod Glass Company was formed by Spurr and the cutting and decorating of glass products gave employment to many men.

The manufacture of tacks was begun by Stephen R. Wing and Stephen R. Rogers, in the old cotton mill southwest of Sandwich Village, originally occupied as a cotton mill, and built by Mr. Wing's father, Samuel. Wing and Rogers did business under the name of the Sandwich Tack Company. They were succeeded by Zenas R. Hinckley, and he by some other Sandwich residents whose names have escaped the historian. About 1863 Jones and Heald bought the property and operated it under its original name until its destruction by fire in 1883.

In the meantime Edward B. Howland had organized the Bay State Tack Company and in 1880 the concern built a factory near the Catholic Church, and operated it for several years. In 1882 Jones & Heald bought of the Central Manufacturing Co., of Boston, which concern had purchased of the Messrs. Burgess a two-thirds interest in this factory, the remaining third owned by Mr. Howland, and continued to operate the works.

The equipment at that time consisted of a 20-horse power engine and 24 tack-cutting machines, located in a building 125 feet by 35 feet in size.

The Cape Cod Glass Company above mentioned was the outgrowth of a business started in 1859 by Deming Jarvis after he severed his connection with the Boston and Sandwich Glass Co. He then erected the building later occupied by Charles W. Spurr & Co., and with his son and son-in-law began the manufacture of glass which continued until the death of the senior Jarvis.

In 1887 Casey Brothers erected a shoe factory, in Dennis, forty by one hundred feet in dimensions, three stories high, and for some years employed 100 hands, turning out 10,000 cases of shoes a year for western markets.

BARNSTABLE COUNTY'S LARGEST INDUSTRY—THE KEITH CAR & MANUFACTURING CO.

Aside from the Cape Cod Canal, which lies almost wholly within the geographical limits of the town of Bourne, which venture it officially sanctioned, through its citizens, in town meeting, in 1801, but which required a full hundred years to reach fruition, the most important local enterprise is the Keith Car & Manufacturing Co., the outgrowth of a wheelwright and blacksmithing business established in 1829, by Isaac Keith. This venture led to the erection by him of a machine shop and forge, in which, in 1849, a vast amount of business was done in manufacturing tools for the California gold-hunters.

In 1890 the Keith Car & Manufacturing Co. was employing but fifty men, and its growth in the intervening forty years, due in a large measure to the business acumen and ability of Hon. Eben S. S. Keith, president of the corporation, constitutes a typical illustration of the fact that no matter how isolated an industrial unit may be, when its location with reference to large centers of population and other manufacturing is considered, it can prosper and grow despite these supposed handicaps.

Here is a concern, by far the largest employer of labor of any mechanical establishment on the Cape, with a capital of $1,600,000, serving the New England railroads and other transportation lines with freight cars of all types, and finding no difficulty in securing its labor in one of the most sparsely settled sections of the Commonwealth. In normal periods it employs 600 men, the majority of them skilled mechanics, and its extensive plant, covering many acres, is a constant source of wonder

to the thousands of motorists who pass it as they cross the Bourne Bridge of the Cape Cod Canal, and to others who journey on boats that daily traverse this water artery.

Bourne's oldest industry was the furnace and works erected on Barlow's River, in 1822, by Hercules Weston and which afterward became the Pocasset Iron Co., manufacturers of stoves, kettles and hollow ware, and which later became the Tahanto Manufacturing Co.

At Bournedale were located an old grist mill, a trip hammer, an axe factory, a nail plant, William A. Nye's drill factory, erected in 1890, and the Howard Foundry Co., which saw its rise in 1831.

CHAPTER VIII

PITTSFIELD

FAMOUS ALIKE FOR ITS WOOLEN TEXTILE AND ELECTRICAL PRODUCTS

Within seven years following the close of the French wars, the first fulling mill and the pioneer iron forge, were established in Pittsfield, the former unit being set up by Aaron Barker, at what is known as Barkersville, in 1768, and the iron mill being built at Taconic Village previous to 1767, by Capt. Charles Goodrich. It was operated until about 1806, and as late as the year 1872, a wagon was frequently observed on the streets of Pittsfield, which bore the first iron axle-tree that was turned out at the Taconic iron works some seventy years before. In 1776, a second fulling mill, built upon an improved plan, was erected near the site of the old Pittsfield Woolen Company's plant.

A fulling mill of the kind then in use, was erected in 1790, by Valentine Rathbun. It was of the old-fashioned, double-action crank type, driven by a 3-foot open bucket water-wheel, requiring a strong head of water. The shearing was done by hand. Six years later Deacon Barber started a rival concern. The first local tannery was built in 1795 by Capt. Daniel Weller.

Following the abandonment of the iron forge early in the nineteenth century, Lemuel Pomeroy's famous musket shop was erected on its site,



LEMUEL POMEROY
of Pittsfield

One of the pioneer woolen manufacturers of the United States

in 1809, and it was between 1816 and 1846, during which period Pomeroy continuously held contracts with the United States Government for the manufacture of muskets, that he amassed profits of such size as to enable him to lay the foundation of his successful woolen manufacturing ventures to which Pittsfield traces much of its industrial prowess. In 1812, at the beginning of the second war with England, and at a time of great uncer-

tainty, Pomeroy, with that courage so typical of New Englanders, launched his venture and engaged in the manufacture of woolen goods. On February 18, 1814, by legislative act, the Pittsfield Woolen and Cotton Factory, one of the pioneer enterprises of Berkshire County, was created with Pomeroy, Joseph Merrick, Ebenezer Center, Samuel D. Colt, David Campbell, and others, as his associates, and with capital of $130,000.

It was on November 2, 1801, at the very dawn of the nineteenth century, when Arthur Scholfield made his first public announcement in the columns of the *Pittsfield Sun* that he was ready to card wool on the machine he had invented and perfected.

In 1804 he turned out the first yard of fine broadcloth made in the United States, fashioned from the fleece of imported merino sheep, flocks of which had been purchased by various Berkshire County farmers who were anxious to improve the quality of raw materials entering into the textile production of that period. Scholfield wove the broadcloth on machinery which he had constructed, without the benefit of patterns or drawings. Four years later, he produced a 13-yard piece of black broadcloth, which he presented to President James Madison, who had it fashioned into a suit that he wore at his inauguration—doubtless the first instance where a chief magistrate had appeared to take the oath of office clothed in all-American garments.

HUMAN NATURE NO DIFFERENT IN 1930 THAN IN 1804

In 1804 occurred one of those amusing episodes, the counterpart of which we observe even in this day and generation, and it is evident that the desire among certain people, to own commodities bearing the stamp of foreign producers, was as strong in the early days of the last century as it is in the second quarter of the twentieth. Three years after Scholfield had placed his carding machine at the service of the men and women of Berkshire County, he wove some grey broadcloths which he offered to the merchants of Pittsfield, but fearing there would be no market for so plebian a product they were loath to accept them, and he disposed of the goods in the New York market. A few weeks later, Josiah Bissell, one of Pittsfield's leading merchants, brought home two pieces of cloth, which he had purchased in New York, where he was informed by the wholesaler that they had been imported from abroad. Scholfield's opinion was sought as to their value, and he had the extreme pleasure of exhibiting to Bissell the private mark he (Scholfield) had placed on the two bolts of cloth, and of proving that they were the same identical goods Bissell had previously rejected.

Scholfield's double carding machines were being sold at this period for $400, although his initial machines, produced about four years before, are said to have brought $1,300 each. By 1805, the cloth manufacturers and dressers had become so numerous in Pittsfield that a public proposal was made for their formation into a society, the purpose of which was to investigate the natural qualities of chemical liquids, and for improving the production and dressing of cloth—one of the earliest recorded instances of mutual protection by a group of industrialists.

In after years, linen duck for sails, cordage made in a rope walk, tanneries, which flourished from 1798 to about 1850, tack manufacturing plants, thread works, clock establishments, shirt making plants, overall manufacturers, shuttle and reed producing concerns, tinware manufacturers, carriage and wagon plants, cracker manufacturers, and, shades of the Volstead era, a real brewery, constituted the gamut of industries that

took the place of the early grist and saw mills, the fulling factory and the iron works of old Pittsfield, and yet, with the wide range of products enumerated the size of the factories, the number of employees and the value of the products were infinitesimal compared to the 1927 industrial output of Pittsfield's 35 or more manufacturing units.

In the fall of 1808, John B. Root, a local merchant began the manufacture of sail duck, from flax, and two years later Eli Maynard became a partner in the enterprise which became known as the firm of Root & Maynard, the plant being located on the east side of Elm Street, midway between East Street and the river. In 1812, when Oliver Robbins entered the firm it took the name of Root, Maynard & Company. Three years later Mr. Maynard became sole owner. In 1813 the United States frigate *President* was equipped with sail cloth, manufactured in Pittsfield, and presumably at the plant of Root, Maynard & Co., as there is no evidence of the existence of any other local concern engaged in that type of product.

The statement is also made that a part of the cordage used on the frigate was manufactured by Seth Moore, of Pittsfield, who conducted a rope-walk in the town, from 1804 to 1814.

WHEN THEY TOOK POLITICS SERIOUSLY

In 1812, the Housatonic Mfg. Company was incorporated and as it came into being at a period when politics governed everything mundane in the then youthful American republic, and as it was regarded as democratic, as were many of the hotels, churches, banks, and other institutions of that period, the federalists, led by Pomeroy, deemed it essential to incorporate two years later the Pittsfield Woolen and Cotton Factory.

THE EATON, CRANE & PIKE CO. TRACES ITS HISTORY BACK 123 YEARS

The germ of the idea which later developed into the Eaton, Crane & Pike Co., was conceived in the mind of Col. Arthur W. Eaton, then president of the Hurlbut Paper Co., which had been established at South Lee, in 1807. For sixty-five years thereafter, hand-made writing papers were produced there and, in 1872, the concern established a new mill for the production of papers by machinery, which became the predecessor of the Hurlbut Paper Manufacturing Co., organized in May, 1888, and of which Thomas O. Hurlbut was president, and Arthur W. Eaton was treasurer.

The latter foresaw great possibilities in the development of fine stationery and decided to organize a branch company to manufacture the product of the Hurlbut mill into stationery. In July, 1894, the Hurlbut Stationery Co. was formed, as a branch of the parent concern, and began business in Pittsfield, with Charles C. Holcombe as president, Mr. Eaton as treasurer and general manager, and William A. Pike as vice president.

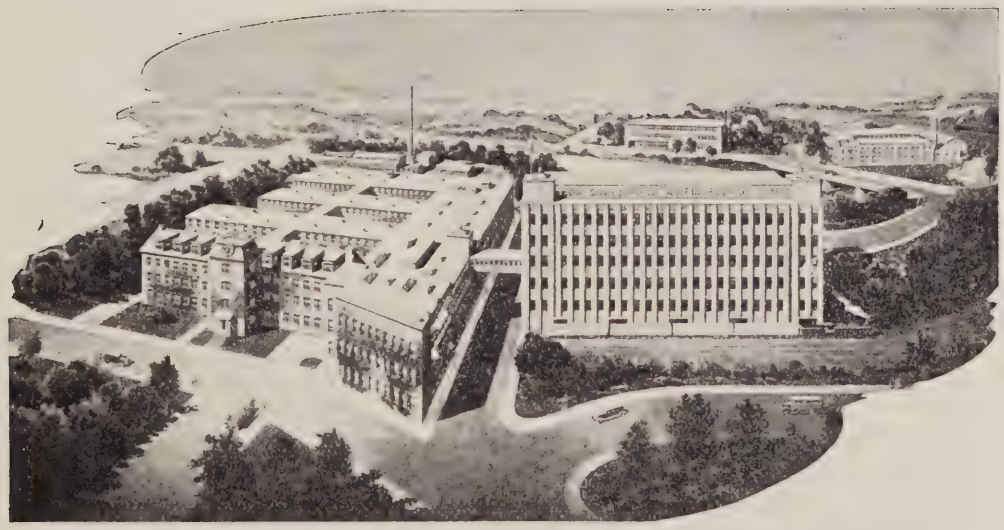
The business of Hard & Pike, manufacturing stationers, which had been in existence in New York City for a number of years, was purchased by the new unit, and consolidated with its business in Pittsfield.

When the consolidation of the American Writing Paper Company, which included the Hurlbut Paper Mfg. Co., took place in 1899, the Hurlbut Stationery Company was bought by Mr. Eaton and his associates, and the name was changed to the Eaton-Hurlbut Paper Company.

The business showed substantial growth and continued under that name until 1908, when the Messrs. Crane of Dalton acquired an interest in the Pittsfield concern which became the manufacturing agent for the sale of the Z. & W. M. Crane papers, and at which time the name was changed to Eaton, Crane & Pike Company.



ORIGINAL PLANT OF EATON, CRANE & PIKE COMPANY,
PITTSFIELD



PRESENT PLANT OF EATON, CRANE & PIKE COMPANY, PITTSFIELD

Operations began in a single modest building, formerly owned by the Terry Clock Co. As the years rolled by many additions were made and the company absorbed the Berkshire Typewriter Paper Co., and the Sisson & Robinson box shop. In 1908, a new building was added, known as Factory No. 2, which provided a training school for new employees and in which sufficient machinery was installed to guarantee against loss of production in case of fire destroying Factory No. 1. The famous Airedale Mills became Factory No. 3, in 1913, and are today used for storage purposes. In 1920, a large building for storage and shipping purposes was built as a part of Factory No. 1, and in 1924 an unusually fine plant was purchased which has become Factory No. 4. Growth has been rapid from a single humble building to the four large factories covering a total floor space of 8.32 acres.

About 25 tons of fine writing paper are daily consumed in the manufacture of note and letter papers, envelopes, tablets, and cards and approximately three carloads of finished product are shipped daily.

The company maintains and operates branch offices and salesrooms, with warehouse facilities, in New York, Boston, Philadelphia, Cleveland, Chicago, Kansas City, New Orleans, and San Francisco, with a branch manufacturing plant at Toronto, Canada, from which point the product is distributed throughout the Provinces.

Today, it employs in the various factories and offices about 1,500 men and women, and the average daily output is more than twenty times that of 1899, when the business was begun in Pittsfield.

In 1928, the manufacturing facilities were supplemented by the purchase of the modernly equipped paper mill of the Berkshire Hills Paper Co., at Adams, where are manufactured various grades of writing paper other than those made at the Crane Mills at Dalton.

The product of the company is widely known and distributed throughout the United States and Canada, as well as in many foreign countries.

The present officers are Arthur W. Eaton, president; Henry D. Brigham, Charles C. Davis, Winthrop M. Crane, Jr., and Charles B. Wheeler, vice presidents; Frederick G. Crane, Jr., secretary, and Col. William H. Eaton, treasurer.

THE MORE THAN A CENTURY-OLD PONTOOSUC WOOLEN CO.

The Pontoosuc Woolen Mfg. Company, formed in 1825, incorporated in 1826, formally starting operations in the spring of 1827, and which observed in 1927 the first century of its corporate existence, is typical of the ability of Massachusetts manufacturers to adjust their production to the changing trends of fashion and to altered requirements of the market. At first it undertook to supply all grades and colors of the goods it produced, and from 1827 to 1834 its output was made up of plain broadcloths and cassimeres.

From 1834 to 1860 it manufactured carriage cloth almost exclusively, and in the latter year it turned to ladies' balmoral skirts. Five years later its principal product was carriage robes and up to 1872 it had manufactured 162 distinct patterns of this type of goods. Then came the demand for Pullman car blankets, at that time denominated as "sleeping car" equipment and almost all of its production was of that nature.

Positive evidence that outside capital still is interested in investing in going Massachusetts textile concerns was shown, when, in August,

1928, this more than a century-old concern, was bought by Louis Bachmann, of New York City, and is now manufacturing men's suitings and coatings. The change of ownership brought to Pittsfield the Pascoag Woolen Co., of Pascoag, R. I., another concern controlled by the Bachmann interests, which are also represented in two other Massachusetts textile concerns—the Uxbridge Worsted Co., of Uxbridge and the Daniels Mfg. Co., of East Brookfield.

The year previous, the Pontoosuc concern installed great quantities of new machinery, relocated the old and rearranged the plant for more efficient and economical operation, and added a two story and basement structure to the mill. L. B. Bachmann is president and treasurer, and J. V. Clement, secretary of the corporation, which now operates as the Pontoosuc Mills, Inc.

THE FATHER OF "JOSH BILLINGS" WAS A BERKSHIRE COUNTY MANUFACTURER

Henry Shaw, of Lanesboro, at one time a member of Congress, and the father of one of America's greatest humorists, Josh Billings (Henry W. Shaw) was the first president of the company. The senior Shaw was an ardent friend and disciple of Henry Clay, the famous whig leader, whose advocacy of legislation for the development of home industries gained him nation-wide support and popularity. Mr. Shaw maintained a large colony of sheep on his farm, and the wool from their backs was used in the pioneering production era of the company with which he was identified.

Shaw's associates were David Campbell, Jr., Thaddeus Clapp, Jr., and George W. Campbell.

THE S. N. & C. RUSSELL MFG. CO. IS 110 YEARS OLD

The present S. N. & C. Russell Mfg. Company had its genesis in a small building erected about 1820 on or near the site of a forge, originally built by Rufus Allen on Onota Brook, and occupied until 1843 as a factory for carpenter's tools. In 1843 cotton batting was produced there by the first of the Russells—Solomon N., and his brother, Charles—who engaged in textiles. The product was next changed to wadding and discontinued in 1860. In 1856, prior to the time the cotton business was discontinued, the concern leased the Wahconah Mill and made woolen cloths for consumption by the U. S. Army. Later, balmoral skirtings were manufactured there.

In 1863, nearly opposite the batting mill, was built the main building of the plant as it is today. It is 180 feet long and three stories high. Two other structures, one a dye house and the other containing a boiler room, picker room and dry room were erected at the same time. The mill then employed 125 hands and made various classes of fine woolen goods, including fancy union cassimeres.

Additions were built from year to year as the business grew, until the present floor space of the mill is more than doubled. The plant now employs 350 hands in the production of woolen fabrics for ready-to-wear men's clothes and sells its products, through Sanford & Russell, a commission house in New York City, which is partially owned by Harry R. Russell, president of the Russell Mills.

Early in 1928 the S. N. & C. Russell Mfg. Co. declared a 300 per cent stock dividend, thus increasing its capital stock to $400,000 and carrying authorization to raise it to $500,000.

The present officers of the mill are Henry R. Russell, a nephew of the founders of the industry, who started his business career at this mill in 1893 after attending Amherst College; and Carey R. Kinney, treasurer and secretary, who came to Pittsfield in 1906, from Toledo.

Allied with the Russell Company for eleven years was the Kinney Worsted Yarn Company, of Pittsfield, founded in 1916 by Harry R. Russell and Carey R. Kinney, which employed 125 hands and occupied a two story mill, 360 by 60 feet, and which was enlarged in 1919, when the spindle capacity was increased from 4,000 to 6,000. The plant produced weaving yarn, Mr. Russell being president and Carey R. Kinney, treasurer of the concern.

In December, 1928, the mill, which had been idle since the previous August, was leased by the Elmvale Worsted Co., which was formed with $100,000 capital. Substantially the same line of goods are produced as previously, and from 100 to 150 operatives are employed. Bertram W. Spencer is president and treasurer, and Walter N. Cooper, assistant treasurer and clerk, both having been identified with the former concern, as superintendent and assistant suprintendent, respectively.

THE A. M. CHAPEL MACHINE CO.

In 1850, Edson Bonney established a machine shop, in Pittsfield, which for almost eighty years has continued to occupy its original location. In 1928 the concern, known for many years as the A. M. Chapel Machine Co., was reorganized, and completely modernized to meet the requirements of a motor age. At that time, James F. Bowe, who, since 1907, had been associated with the company as superintendent, bought the controlling interest and the following officers were chosen: President, James F. Shipton; treasurer and manager, James F. Bowe; shop superintendent, Ethelbert Pierce; foundry superintendent, Leon Sultaire; clerk, William J. McKee.

The shops are equipped with the latest machinery for repairing automobiles, internal and external grinders for automobile cylinders, etc., a full equipment of small tools, expansion reamers, a planer which will plane a metal bar or shaft 30 by 30 inches by 10 feet in dimensions, a lathe which will turn a shaft 24 feet long, a boring mill which will turn a pulley eight feet in diameter, two modern shapers, milling machines, drills, presses, and small lathes, making it one of the best equipped machine shops in western Massachusetts.

In 1850, Allen B. Wilson, of Pittsfield, was given a patent on a double pointed shuttle, which made a stitch at each backward and forward movement—the first considerable improvement made in Elias Howe, Jr.'s sewing machine shuttle—and in 1851 and 1852, Wilson received patents on a rotating hook and a four motion feed.

In 1852 a satinet mill, 50 by 100 feet, and three stories in height, was built in Pittsfield, and equipped with fourteen sets of machinery. It employed 275 operatives, and produced 6,000 yards of double width cloth weekly. The plant was heated by steam and lighted by gas, even at that early period.

In 1863, Thomas Colt built a paper plant, in Pittsfield, close to the Dalton town line, and in 1876 another paper mill was erected by Chalmers Bros. & Dexter, where paper was manufactured for collars. In 1879 this plant was sold to Crane & Co. Burned in 1892 it was rebuilt and is denominated the East Mill.

THE W. E. TILLOTSON MFG. CO.

In 1864, Otis Tillotson and B. F. Baker bought the water power rights and the assets of the Osceola Flouring Mills, in West Pittsfield, then operated as a woolen mill, and in 1873, W. E. Tillotson and D. M. Collins acquired the property following the death of Otis Tillotson, and established the present W. E. Tillotson Mfg. Company. By 1901 the corporation had capital of $350,000 and the factory, at Silver Lake, was merged that year with the W. E. Tillotson Co., which was then equipped with 80 looms and 6,000 spindles. In 1907 Louis Hollingsworth became a partner.

The company's present day 600 employees turn out fancy worsteds and woolens and knit underwear, as well as paper boxes, the value of which constitutes no inconsiderable part of Pittsfield's annual industrial production. The Tillotson concern is now capitalized at $1,000,000.

In 1924 when the company was threatened with dissolution, James R. Savery, and a group of Pittsfield manufacturers, re-incorporated and refinanced it, and today it is producing Collins' health underwear and knit worsted fabrics. In 1929 new machinery was installed and overcoatings and topcoatings are now being produced.

D. T. Noonan is president, W. V. E. Terhune vice president, James R. Savery treasurer, and W. Edward Hayn assistant treasurer.

THE CHANGING STYLES IN WOOLENS AND WORSTEDS

Illustrative of the growth of woolen and worsted manufacturers in Berkshire County it is interesting to turn back the pages of history two-thirds of a century, and gaze upon the local and vicinity industrial picture of 1864, as it related to textile production. Most significant are the changing types of products compared with those of present day manufacture.

The woolen mills of 1864 were as follows:

Name	*Town*	*Sets of Cards*	*Product*
L. Pomeroy's Sons	Pittsfield	10	Cloths and woolen cassimeres
Pontoosuc Manufacturing Co.	"	8	Balmoral skirts
Taconic Mills	"	8	Union cassimeres
Pittsfield Woolen Company	"	4	Fancy cassimeres and skirts
S. N. & C. Russell	"	6	Fancy cassimeres
J. V. Barker & Bros.	"	10	Fancy cassimeres
D. & H. Stearns	"	8	Union cassimeres
Peck & Kilbourn	"	1	Flannels and balmoral skirts
W. J. Hawkins & Co.	"	1	Flannels and balmoral skirts
Barker & Tillotson	"	1	Cassimeres
Berkshire Woolen Company	Gt. Barrington	12	Fancy cassimeres
Elizur, DeWitt & Wellington Smith	Lee	9	Fancy cassimeres
Glendale Woolen Co., J. Z. & C. Goodrich	Glendale	10	Army cloths and Union cassimeres
Barker & Company	Hancock	3	Satinets and balmoral skirts
William Taylor	"	2	Wool yarn

——— Birmingham	Dalton	1	Balmoral skirts
Plunkett Woolen Co. (3 mills)	Hinsdale	12	Broadcloths, Union cas. and satinets
F. W. Hinsdale & Brother	"	4	Union cloths
Dean & LaMonte	South Adams	6	Fancy cassimeres
Blackinton & Phillips	"	6	Fancy cassimeres
Briggs & Brother	North Adams	2	Union cassimeres and meltons
S. W. Brayton & Co.	"	4	Satinets and Union cassimeres
Tyler & Bliss	"	8	Fancy cassimeres and tweeds
S. W. Blackinton & Son	"	10	Fancy cassimeres and tweeds
Perry & Penniman	"	2	Union cassimeres

E. D. JONES & SONS COMPANY

In 1867, Edward D. G. Jones settled in Pittsfield, removing from East Lee, where he had manufactured paper mill machinery. He formed a partnership with John W. and Henry C. Clark, under the name of William Clark & Co., and in 1878 the firm acquired the plant built by McKay & Hoadley, at that time actively engaged in the production of Duckworth looms, mowing machines, boilers and steam engines, the concern being known at times as Russell, Cleary & Sedgwick, and later Russell & Cleary. Mr. Jones consolidated the business in the Clark firm, which continued to operate under this name until 1890, when he purchased the Clark interests and organized the firm of E. D. Jones Sons & Co., which included his sons, Harley E., and Edward A. Jones, and Walter T. Noble. In 1893, the business was incorporated as E. D. Jones & Sons Co.

The product of the plant is machinery used in the manufacture of paper, consisting principally of beating and washing engines, Jordan or refining engines and dusting machinery, which machinery is used for preparing the raw materials before the paper stock is delivered to a paper making machine.

This company lists among its valued customers a majority of the leading paper mills in the United States and Canada and many in foreign countries.

The plant has been operated for nearly thirty years at practically its full capacity with only one or two short periods of part time. The company is capitalized for $720,000. Stanley P. Benton is president, and W. E. Bardwell, treasurer, of the corporation, which employs 150 operatives.

In 1875 the Pittsfield Tack Co. was organized with $30,000 capital and operations continued until 1901 when the plant was closed.

The Terry Clock Co. was established in 1880, with $75,000 capital and five years later was manufacturing over 150 kinds of clocks, turning out a total of 2,000 each week, and employing 110 men.

THE A. H. RICE COMPANY

In 1876, William B., and Arthur H. Rice, with S. K. Smith, formed a partnership and began manufacturing silk thread, employing thirty operatives at the start. Four years later silk braid was added to the line of

products, and in 1884 the Messrs. Rice purchased the interests of Mr. Smith and organized A. H. Rice & Co.

At that period, the company maintained a small wooden factory which gave employment to about fifty hands. Fire destroying the original plant, the firm moved to larger quarters in an idle brick woolen mill at Spring and Burbank streets. Having added mohair braid to the line of commodities produced, the concern purchased the mohair braid business of the Barnes Mfg. Co., of Paterson, N. J., and installed the equipment in the Pittsfield plant.

By 1896 the business required more manufacturing space and new buildings were at once erected, and five years later intricate machines for making fancy braids were installed.

In 1905 the A. H. Rice Co., was organized under Massachusetts laws with the late William B. Rice as president, Arthur H. Rice treasurer, and Robert F. Stanton, secretary. In 1914 the father retired from active participation in the business, and the late Arthur H. Rice was made president, and William T. Rice, son of Arthur H. Rice, came into the business after finishing at Williams college in 1913, and was elected vice president of the company, in 1917.

Rice's sewing silk has been recognized as one of the very few standard brands for almost fifty years, being used in dry goods and department stores, men's and women's tailoring establishments, and in shoe and hat factories.

Rice's line of braids was originally confined to the very highest class of pure dye sewing silk binding and dress braids for men's fine tailoring. This line continues to be the best known in the country. Gradually braids for other purposes have been added, until in recent years the firm has come to rank among the most important makers of braids for women's garments. Unlike the braids for men's work these dress trimmings are made from rayon in hundreds of different and constantly changing patterns and colors.

The trade marks of the firm are known by silk thread users the country over. Sales offices are located in New York, Chicago and St. Louis, with resident selling agents in other important cities.

The plant contains one of the most complete and up-to-date silk thread making equipments in the country and upwards of 50,000 square feet of manufacturing space are occupied. In the braiding end are more than 1,000 machines representative of the type in the best American and foreign makes. The company steadily employs some 250 persons.

In 1928, the corporation purchased the business of the Waltzfalder Braid Co., of Brooklyn, N. Y., including its good will, trade marks, and patterns, and consolidated it with its Pittsfield activities.

W. T. Rice is president and treasurer, and R. F. Stanton, vice president and secretary of the corporation.

WILLIAM STANLEY—FATHER OF THE ELECTRIC TRANSFORMER

William Stanley, the inventor of the transformer, and the founder of the Stanley Electric Manufacturing Company, which, in 1907, became the Pittsfield Works of the General Electric Company, was born in Brooklyn, N. Y., on November 22, 1858, and died in Great Barrington, Mass., on May 14, 1916, in his fifty-eighth year.

Among his many inventions the most important are the electric transformer, and the alternating-current system of long distance transmission and power supply. These are the basis of the modern high-voltage trans-

mission systems which have made electric power so universally available. Stanley was the first to obtain a clear conception of the physical laws controlling the transformation of electric power, and it was in his laboratory in Great Barrington, that the first transformer was built, in 1885. In order to give a practical demonstration of the value of his invention, he hired an old rubber factory near that town, and equipped it as a power station, with boilers, a steam engine, and an alternating-current generator. From this primitive central station an alternating-current line was run to the village, utilizing trees as poles, and about twenty stores and other buildings, including offices and hotel, were wired. The first successful operation of the plant took place on March 6, 1886.

The name of William Stanley will forever remain recorded in the annals of electrical discovery, invention and engineering as not only representing one of the world's greatest exponents of the electrical art, but also as the man to whom the city of Pittsfield owes more for its phenomenal industrial development in recent years than to any other citizen of the community. Devoting his earlier career to activities with Hiram Maxim, and to various electrical enterprises in Newark, N. J., and Boston, where, in the latter city, he completed one of the most important experiments and inventions of his life by producing a device for exhausting incandescent lights by machinery, which process has continued in use. He determined to enter the manufacturing field, and, in January, 1891, formed the Stanley Electric Manufacturing Company, with capital of $25,000, and began operations in a brick building, located on the west side of Clapp Avenue, in Pittsfield, at its juncture with the Boston & Albany R. R. The first floor, together with the rear of the basement which was used for storage purposes, comprised the entire manufacturing and testing space.

The engineering and experimental work was done by the Stanley Laboratory Company, then located on the second floor of the Cottage Row (Eagle St.) station of the Pittsfield Electric Company. This company was absorbed by the Stanley Electric Mfg. Company about 1900.

The Works' Engineer was C. C. Chesney, now one of the vice presidents of the General Electric Co., who was also associated with Stanley, John F. Kelly and others in the Stanley Laboratory Company.

THE S. K. C. SYSTEM AND WHAT IT PRODUCED

In 1891, Mr. Stanley, with Messrs. Kelly and Chesney, developed the S. K. C. (Stanley, Kelly, Chesney) system, which served as the foundation of the present Pittsfield Works, of the General Electric Company. About thirty men were employed the first year, the factory output of lighting transformers being between thirty and fifty units per week.

During the winter of 1891-92 the manufacture of fan motors was begun on the second floor of the Clapp Avenue building, the business having increased to such proportions that eleven men were employed in the winding room.

In January, 1892, the remaining space in the basement was secured, a pattern department installed, and the manufacture of oiled cloth was commenced, the oil being applied by hand. It was one of the first attempts to produce this article for insulation purposes, though it had previously been made experimentally by Mr. Chesney, in association with Reginald Fessenden of wireless telegraph fame, in Newark, and was there used in motors in a limited way.

When the increase in business required a larger output this work



WILLIAM STANLEY
of Pittsfield

The great electrical inventor
Father of the transformer



AIRPLANE VIEW OF PITTSFIELD WORKS OF GENERAL ELECTRIC COMPANY

was transferred into a small building across the alley. In this structure subsequently was made experimentally, the first enameled magnet wire, a sufficient quantity being produced to wind several transformers and some generator field coils. These transformers were afterwards installed on the lines of the Pittsfield Electric Company.

In March, 1892, work was begun on designing motors and generators, the first of the former that were manufactured consisting of six three horse-power single-phase induction motors. They were turned out by the Stanley Laboratory Company. The first two-phase motors were built in the Clapp Avenue shop, and in 1893, the initial generator, with a rated capacity of 300-kw, and of the two-phase type, was built on the second floor of this factory. It was installed at the upper dam of the Monument Mills, at Housatonic, to generate power for transmission to Great Barrington, this being the first long transmission line ever erected in America. The generator remained in service until about 1910 when it was acquired by the General Electric Co., and is now at the Pittsfield Works. In 1894 the manufacture of meters was begun on the third floor of the Noble Building, nineteen men being given employment in this department.

THE COMPANY SEEKS LARGER QUARTERS

In the fall of 1894 the offices of the company and the motor department were moved from Clapp Ave., to the then new Renne Ave., buildings where had been installed adequate equipment for the manufacture of generators and power transformers. Having also acquired the third floor of the Clapp Ave. shops, the meter department was moved there and the manufacture of switchboards was begun. The force now aggregated approximately 350 men and thereafter the growth of the company was continuous and so rapid that additional facilities were necessary, and, in 1901, the works were moved from Renne Ave., and from Clapp Ave., to the present location, from which time dates the period of the greater Stanley Company, which, in 1907, was absorbed by the General Electric Co.

Here again one finds an illustration of the vital importance to a community of the location of a manufacturing unit in its midst small though it may be at its inception, for, had it not been for the coming of William Stanley, it is doubtful if the General Electric Co. would have selected Pittsfield as the locale of one of its large units, for such the plant has become within the past twenty years.

From a total of 30 employees it has reached a maximum of over 8,500; from the manufacture of transformers of a maximum capacity of 5 kilowatts of 2,000 volts, it has grown to produce transformers of 220,000 volts, as well as lightning arresters, feeder voltage regulators, industrial heating devices, single-phase motors, current-limiting reactors, primary cutouts and capacitators.

But William Stanley's greatest claim to fame in so far as his contributions to electrical service are concerned is in connection with his work in putting the transformer into practical use, all authorities being in agreement that he, more than any other electrical engineer, was chiefly responsible for the feat.

Today, the transformer, greatly increased in efficiency, and of course, in usefulness, as well as in the variety of types, and sizes, is still the chief product of the Pittsfield Works, and it is fitting that it should be as it was here that Stanley carried his theories into practice and evolved this remarkable child of his brain.

THE DEVELOPMENT OF THE ELECTRICAL ART AT PITTSFIELD

The increasing demand for electric power which has characterized the period since William Stanley built his first transmission line has necessitated the utilization of sources of power that are, in many cases, far from the centers of distribution. It has also led to the concentration of generating equipment sufficient to supply a number of such centers at one point, as a matter of economy in power generation. The logical result of these developments has been a continual increase in transmission voltages, in the size of the apparatus involved, and in the complexity of the problem of protecting the apparatus, and the system of which it forms a part, from dangers arising both from internal and external conditions.

As a means for a better understanding of these dangers, and of developing a means to combat them, as well as to aid in the proper design and construction of high-voltage apparatus of various sorts, the Pittsfield high-voltage engineering laboratory was built about fifteen years ago. Today, it is probably the best equipped laboratory of its kind in the world for the study of high-voltage and high-frequency phenomena.

Many physical laws have been first studied in it, and the results are now being used as the basis for every-day work in the manufacture of power transformers, as well as for other apparatus. Such baffling phenomena as transformer resonance and corona are examples of the problems that have been attacked and solved in this laboratory.

Some of the more important results that have been reached recently are the development of the static flux distributing shield for transformer windings, puncture proof high-voltage bushings, and line insulation shields. These, together with other developments, have made the transmission of electric power at 220,000 volts possible, and have aided in making all high-voltage transmission reliable.

The generation and transmission of electricity in excess of 1,000,000 volts was first accomplished anywhere in the world, at the Pittsfield laboratory, on September 13, 1921. The practical transmission of energy voltages now attained only in the laboratory, may be said to be an accomplishment of the future, but in this connection it is important to recall that the 220,000 volts, now utilized in commercial practice, was anticipated in the laboratories of the General Electric Co., twenty years before its application to high-power transmission. Consequently, the Pittsfield experiment is of great significance in view of the rapid expansion of hydroelectric plants and the day of interlocking system hitherto isolated, under the super-power plans of this era.

SOME OF THE PROCESSES CARRIED ON AT THE PITTSFIELD WORKS

One of the recent additions to the Pittsfield laboratory is apparatus for the production of a lightning discharge having a potential of two million volts above ground. The capacity of the equipment is such that it is possible to produce an arc in which the rate of energy dissipation is measured in millions of kilowatts. It is thus possible to study the characteristics of transformers, lightning arresters, and other apparatus under the conditions actually met in practice. Recently, an electrical discharge of 5,000,000 volts was produced and measured by the electrical engineers at this high-voltage laboratory.

The process of arc welding tanks was early developed at the Pittsfield Works, the first large arc welded transformer tank, with metallic elec-

trodes, being shipped from there on July 30, 1915. Since that time, the riveted transformer tank has almost disappeared from the field.

It was at the old Stanley Works that John F. Kelly invented the process for the use of silicon in steel to reduce core loss, which he patented in 1896.

The present intensive engineering on bushings began with the organization at the Pittsfield Works, in 1916, of the high-voltage bushing engineering department, which has charge of the design and supervision of manufacture of bushings for high-voltage apparatus built in the various plants of the company. Under the direction of this department is also carried on the engineering work in connection with high-voltage underground cable joints and terminals and on coupling capacitators for carrier current communication.

To secure valuable design data and to test the apparatus under short circuit conditions, a high current capacity testing station has been built at Pittsfield, the plant being one of the few factories in the world capable of testing its apparatus under this type of service conditions.

Not long ago there rolled out of Pittsfield, bound for Buffalo, six freight cars carrying the various parts of an enormous electrical transformer. Two of the cars bore the tank and the core, each carefully enclosed and provided with a hot water heating system in a little box-like house at one end of each car, while two others carried the accessories. The other two cars were of the tank type, and they transported 13,000 gallons of oil, the total shipment weighing upwards of three hundred tons.

In 1908, a foundry was established at the Pittsfield plant, which in that year turned out 1,000,000 pounds of finished castings. Indicating the growth of this unit it now produces annually castings weighing 33,000,000 pounds. The present foundry building has a floor space of 173,547 square feet, of which 152,665 square feet is used exclusively for foundry purposes.

Altogether the structures at the Pittsfield Works are located on a tract of approximately 200 acres of land, and contain 2,350,000 square feet of manufacturing space.

The porcelain plant is located about one mile east of the main works, and here porcelain insulators are made for transformers, lightning arresters, and cutouts.

Materials, consisting of various clays, feldspar, and flint, are obtained from Pennsylvania, Tennessee, Florida, Canada, and England.

AN EXPLOSION-PROOF BUILDING

This unit is one of the most unusual of the entire group, and is notable in a number of respects, but principally because it is designed to be explosion proof. It is constructed entirely of electrically welded steel with not a rivet used to bind its sturdy skeleton. It has the first and only electrically welded fire escape ever placed on any building in the country, and is equipped with continuous hand rails welded into one piece made from discarded steel rails, finished to satin smoothness by sand-blasting and polished.

The building houses the molded insulation compound department, wherein are made all sorts and shapes of molded insulation. The materials used are mixed dry. A vast amount of dust necessarily is set in motion in the air which is explosive in nature and can be compared to the dust of a flour mill. The slightest spark might ignite it. Every precaution is taken within the plant to prevent explosions.

The explosion-proof feature is based on its many windows which are hung in steel frames closed by bronze friction clips.

When an explosion takes place inside the building, virtually every window in the place blows outward and upward on hinges. There the windows remain and must be closed by hand. The structure is 280 feet long and 40 feet wide, two stories in height.

ANOTHER SIDE OF THE INDUSTRIAL ACTIVITIES

In addition to the ordinary industrial life in the works, there are many extraneous activities, both educational and social, including evening classes, in which employees are given the opportunity to complete, or amplify their education along various lines that will help them to a better understanding of the problems met in their daily work. There are also standardized apprentice courses, foremen training classes, etc. The educational service is supplemented by a series of noon lectures, a works paper, and access to the William Stanley Memorial Library, which contains a collection of 4,000 volumes.

The social activities consist of entertainments given in the auditorium such as moving pictures, dances, lectures, or amateur theatrical productions staged by the employees. The auditorium accommodates 1,000 people, and over 700,000 have attended various meetings or entertainments given in it since it was built.

Upwards of $10,000,000 yearly is paid in salaries and wages at the Pittsfield plant, which is now managed by E. A. Wagner. Among the present-day engineers of high repute at the local works are Guisseppe Faccioli and F. W. Peek, Jr.

In 1929 production at the Pittsfield plant was reported at a higher level than at any previous time in its history, with the exception of a few months in the World War period.

Late that year, the company opened its new building, used solely for the purpose of salvaging waste and spoiled materials. The structure of steel, concrete, brick and glass, is 120 by 80 feet in dimensions, and it enables all salvage operations to be concentrated in one location, and it releases for other purposes a considerable area of floor space formerly used for scrap and salvage. An average of one pound of material is scrapped for every five pounds received at the Pittsfield plant. More than $600,000 was derived in 1928 from the sale of 30,000,000 pounds of scrap, in addition to something like 20,000,000 pounds that were discarded, from which no financial return was received. General Manager Wagner estimated that upwards of $3,000,000 a year was lost at the Pittsfield plant, and with the new building available efforts are being made to substantially reduce this figure by obtaining increased value for the material, and through the general coöperation of the executives, a modern reclamation building, 50 feet square, with towers, was erected in 1929, where the disposal of waste materials accumulated during twenty years is in progress, and where copper, brass and solder are separated and graded, ground into particles and washed.

THE BERKSHIRE SHEET METAL WORKS

The Berkshire Sheet Metal Works, Inc., was formed in 1909 by Daniel L. Hood, who had carried on business in Westfield under his own name from 1898 to his removal to Pittsfield.

In 1927 the concern was incorporated with W. F. Goodell, president and Mr. Hood, treasurer and manager.

THE BERKSHIRE WOOLEN COMPANY

No better evidence of the growth of textile production in Massachusetts is furnished than is found in the rise and progress of the Berkshire Woolen Company. Born and promoted by James R. Savery, who, in 1910, acquired the old J. L. & T. D. Peck Company, and created the Berkshire concern, the transaction resulted in the purchase of 100 acres of land and two mills, one an ancient wooden structure, and the other a more modern factory, around which the new units of the present up-to-date plant have been added.

The payroll of the concern in 1910 was between $3,500 and $4,000 a week. Today it is $15,000 a week and the combined payroll of the Berkshire Woolen Company and the W. E. Tillotson company, both of which concerns are now controlled by the same men, is in excess of $30,000. Over 1,000 employees are kept busy in the four mills.

The officers of the Berkshire Woolen Company when it was organized were: president, Ralph G. Gillett of Westfield; vice president, Arthur W. Eaton; treasurer, James R. Savery. The officers today are: president, D. T. Noonan; treasurer, James R. Savery; secretary, W. G. W. Josselyn. The concern is capitalized for $450,000.

Since 1910 new machinery has replaced the original equipment and several additions have been built. The average annual output of the Berkshire Woolen and W. E. Tillotson companies is about $6,000,000.

THE G. C. A. MANUFACTURING CO.

The G. C. A. Manufacturing Co. was incorporated in 1911 to manufacture tools and patented devices of all kinds. It specialized at first in automobile accessories, but in 1915 perfected and marketed the G. C. A. lamp replacer, a labor saving and safety device for the changing of lamps from the ground.

This device met with immediate success and the demand for it has increased until it is now standard equipment with large and small light and power companies in every part of the United States and Canada and is exported to countries of Europe, South America, Asia and Australia.

Beginning with a small machine shop the company has expanded until it now occupies an entire floor in the Pritchard Building, and is planning for a further expansion in the near future.

C. Harold Floyd is president; Harold D. Grinnell, treasurer, and Reginald M. Ames, vice president and secretary, of the corporation.

PITTSFIELD'S OTHER LEADING INDUSTRIES

The Musgrove Knitting Co., with capital of $132,000, employs 125 men and women, in the production of knitted underwear, C. K. Ferry being president, P. E. Miller, treasurer, and A. W. Wood, secretary of the corporation.

For many years the local industries have attracted to that section of the state artisans versed in the mechanical trades, as Pittsfield has within its borders many plants engaged in metal trade production such as the local unit of the Bay State Elevator Company, Inc., whose home office is in Springfield, with a branch in Worcester; Robbins, Gamwell & Co., producers of special machinery, and employing 75 hands, the partners being E. H. and L. G. Robbins, and Richard H. Gamwell; the Boston Auto Gage Co., employing about 70 in the manufacture of gauges and fuel oil accessories, R. H. Gamwell being president, J. L. Robbins

and C. R. Hare, vice presidents, and L. G. Robbins, secretary and treasurer; the Rico Ignition Co., producers of ignition apparatus, C. A. Mattison being president, LeRoy E. Shaw, secretary, and Edward B. Jacobson, treasurer. The Taconic Leather Goods Co., manufacturing leather goods; the Berkshire Lumber Co., with capital of $200,000, J. A. Herd being president, William T. Butler, treasurer, and L. A. Chase, secretary; Owen Coogan & Sons, manufacturing hides, calfskins and tallow; the Pittsfield Coal Gas Co., with capital of $1,000,000, employing 150, producing artificial gas, and the Pittsfield Electric Co., with capital of $1,000,000, employing 110 workers, in producing electric heat, power and light; are among the other enterprises of the city.

The manufacture of lime has long been a prominent industry in Berkshire County and in Pittsfield are centered the activities of the New England Lime Co., capitalized for $2,888,000 with plants at Adams and Rochdale.

Bernard L. McNulty is president, A. V. A. Felton and C. C. Loomis, vice presidents, R. S. Peotter, secretary, and Willits Pollock, treasurer.

The Pittsfield Lime & Stone Co., employs 30 operatives, in the manufacture of lime, Rolla N. Soper being president, and George H. Haig, treasurer of the corporation.

Crane & Co., Inc., of Dalton operates one of its plants in Pittsfield and the National Biscuit Co. maintains one of its Massachusetts units in the city.

The Pittsfield Milk Exchange, Inc., with capital of $200,000, employs 35, in the manufacture of ice cream and butter, Frederick G. Crane, Jr., being president, S. H. O'Herron, treasurer, and B. J. Curtin, assistant treasurer.

For the year 1927, the total number of manufacturing establishments in operation in the city was 63, representing a capital investment of $29,077,622. The total value of all products manufactured in these 63 establishments in 1927 was $50,191,653, the value of stock and materials used in manufacture was $18,633,388, and the difference between these amounts, $31,558,265, represented the value added by the various manufacturing processes. The average number of wage-earners employed in these establishments during the year was 8,746, and the total amount paid in wages was $11,828,819.

CHAPTER IX

NORTH ADAMS

RENOWNED AS A COTTON TEXTILE AND SHOE PRODUCING CENTER

The original grist and saw mill, owned by Ephraim Williams, was built near the first dam which was thrown across the Hoosac River, in North Adams, near where now stands the plant of the James Hunter Machine Company, and in all probability was erected soon after 1750.

This enterprise was undoubtedly the earliest major industrial development in North Adams, but several sawmills soon followed the initial attempt.

In 1793 or 1794 David Estes began cutting iron nails by manual labor, procuring the tools in Rhode Island, and the nail rods from the famous Salisbury forge, in Connecticut. He continued operations until 1810.

In 1793 Joseph Darby set up a trip hammer and manufactured scythes, saws, axes, hoes, steelyards, etc., of Salisbury iron, and about 1800 Jeremiah Colegrove built an oil mill on the west side of the Hoosac, where he crushed flax seed between iron rollers and under mill stones, mixing the seed with water and pressing it out by employing a screw press of great power, the commodity appearing in a pure state. The oil-cake proved an excellent feed for horses and cattle. Flax was extensively cultivated in the vicinity at the time and made into domestic linen. Colegrove continued operations until about 1830 when cotton cloth became so generally used there was little profit in growing flax.

In 1798 Monroe Dickinson began wagon-making and the following year Messrs. Dickinson and Brown erected a forge for making wrought iron from ore which they secured from Chester, South Adams and Stamford, Vt.

About 1804 they mixed the local ore with pig iron from Connecticut, and turned out a fine specimen of wrought iron, which was denominated as "refined iron," the commodity selling for $140 per ton.

In 1798 or 1799 Roger Wing set up the first cloth dressing mill in North Adams and in 1801 a carding machine made its advent in the town, and David Estes erected the first local factory for the carding of wool and the dressing of cloth.

THE COMING OF GILES TINKER

In 1802, at the age of 21 years, Giles Tinker came to North Adams, then a village of 21 houses, and two years later began the manufacture of machines for carding wool into rolls, his initial operations being carried on in a building on River Street. The name of this youthful industrial entrepreneur is even today revered in northern Berkshire County, as it has come down in history as synonymous with the beginnings of manufacturing operations in western Massachusetts.

After a few months, Tinker formed a co-partnership with Capt. E. Richmond, and the new firm occupied a shop at the corner of Main and Brook streets.

In 1809 Tinker bought two acres of land on Main Street and built a shop where he operated business in his own name, and two years later, with others, he erected the "Old Brick Factory"—the first cotton mill in Adams and one of the first in Berkshire County. It was of brick construction, four stories in height, 55x34 feet in dimensions; and four small dwellings were also built by the group, which started manufacturing operations with a joint capital of $20,000, a large enterprise for those days. Fashionable blue checks and stripes were woven.

In 1804 Jeremiah Colegrove erected a two-story building on the east bank of the Hoosac River where wool carding, cloth fulling and dressing were carried on for 15 years thereafter, and the same year Charles Peck and Henry Crittenden began the manufacture of hats, Enoch Chase purchasing their business in 1816.

The second cotton mill erected was the Eagle Factory, located on the North Branch, built in 1813, of wooden construction, four stories in height, 82x45 feet, and here satinet and all-wool cloth were produced. This unit operated with indifferent success until 1845, when the plant was destroyed by fire.

The first factory in the village of Blackinton was erected in 1813, of wooden construction, three stories high, 25x60 feet, and here, too, satinet and all-wool cloth were manufactured and nine years later Rufus Wells and others built a factory there 25x40 feet, two stories high.

In 1817 a cupola furnace was set up for the production of iron castings for gears and machinery, and that year Messrs. Darby & Norton began the production of stoves. In 1826 the cupola furnace was devoted to the manufacture of machine and plow castings.

By 1825, Adams boasted two carding and cloth factories; two grist mills, one sawmill, an oil mill, a machine shop and a tannery. That year Giles Tinker built the brick machine shop, called the "Phoenix," which, three years later he enlarged to 34 by 100 feet, four stories high.

By 1830 there were 15 factories in operation in Adams and North Adams, 12 of them being cotton mills and three woolen mills. In the eight cotton plants 164 power looms were operated, and the concerns boasted of 5,079 spindles. In the aggregate they produced 1,065,000 yards of cotton cloth annually.

As indicating the progress made in three decades it is interesting to observe that 30 years later, the Phoenix Mills, equipped with 92 looms, turned out in a year 1,158,333 yards of cotton cloth, or 93,333 more yards than the 164 looms of the 1830 vintage.

In 1830 the woolen mills of Wells, Blackinton and White, equipped with 9 looms, manufactured 52,000 yards of satinet yearly; David Estes & Sons plant, with 7 looms, produced 20,000 yards annually and Ingalls, Wells & Burke, with 6 looms, 30,000 yards a year—little danger of overproduction in those days.

In connection with the water power facilities of North Adams, there exists what appears to be an almost unbelievable condition, but which tradition dating back to the early settlers asserts to be true. A dam of great strength and durability was constructed on Hudson Brook by a band of beavers, at a narrow gorge just below the natural bridge. The constant toil of these busy little creatures, coupled with the annual precipitation during the spring floods of masses of driftwood and muck raised

the dam to a great height and caused the water to flow so far back up stream as to obliterate the natural falls.

In 1845 the North Adams Iron Company was incorporated and in December, 1846, Nelson H. Stevens, of Richmond, erected a blast furnace, costing $6,000 for the manufacture of high grade pig iron. The following year the North Adams Iron Company was chartered. The Kingsley ore bed had previously been purchased by another group and for several years this unit turned out five tons of pig iron a day, which sold as high as $35 to $40 a ton. The panic of 1857 dealt the enterprise a mortal blow.

In 1860 North Adams had a print works, two large woolen mills, a cotton factory, three sawmills, a tannery, a brick yard, a marble quarry, a stone sawing shop operated by water power, two planing mills, a box factory and three shoe shops.

THE "HEATHEN CHINEE" TRIES HIS HAND AT SHOE-MAKING

For many decades shoe manufacturing has occupied a prominent place in the industrial activities of North Adams and it was here that one of the most interesting experiments in American manufacturing annals was carried on for more than ten years.

In 1869 and 1870 local labor troubles developed in connection with the employment of shoe workers, and one manufacturer, convinced that he could not satisfactorily treat with his working force, imported into North Adams on June 13, 1870, seventy-five Chinese who were put at work producing shoes. Later, the total was increased to 125 and for ten years thereafter they worked as bottomers, and became skilled in the craft.

Do you remember in the gay eighties how everybody vied with each other in decorating their persons and their homes with Zylonite? In 1881, the manufacture of this commodity gave rise to a prosperous village in North Adams, called Howland, where $750,000 was invested in the enterprise and two years later the first manufactured goods were placed on the market,—a combination of paper, camphor and alcohol,—the first named material being made by the L. L. Brown Company at its Cummington plant. The products appeared in all colors, lent themselves to a high polish, and ivory, amber, camelia, agate and malachite were more successfully imitated than in any commercial article that had appeared upon the American market up to that period.

The Zylonite Comb & Brush Company, the Zylonite Novelty Company and the Zylonite Collar & Cuff Co., appeared almost over night. Water was supplied the factories from artesian wells, which dotted the landscape.

THE WINDSOR PRINT WORKS

The Windsor Print Works had their inception in the early part of the last century, being the first unit of its kind to become established in Western Massachusetts, as well as one of the first in the country. When manufacturing pioneers were bringing their industries from the old countries of the world, Caleb B. Turner, the Windsor pioneer, erected a small factory in North Adams, and the next year began the printing of cotton goods. Two years later he was joined by Walter Laflin. They immediately erected a brick building where they carried on an extensive business, printing cotton goods until the panic of 1837. The plant remained idle until 1843, when it was purchased by James E. and Joseph Mar-



WINDSOR PRINT WORKS DIVISION OF THE CONSOLIDATED TEXTILE CORPORATION, NORTH ADAMS, ABOUT 1870



THE PRESENT WINDSOR PRINT WORKS DIVISION OF THE CONSOLIDATED TEXTILE CORPORATION

shall, who repaired and rebuilt it in part, and leased it to Harvey Arnold and Jerome B. Jackson.

In 1847, before the lease expired, the Hudson Print Works, of Hudson, N. Y., were destroyed by fire, and an arrangement was effected whereby that company's goods were printed by Arnold & Jackson, under the name of "Union Prints."

Joseph Marshall, who had become sole owner of the North Adams plant, sold the entire manufacturing property and print works on January 1, 1849, to R. H. Wells, Joseph L. White, Amasa W. Richardson and Jerome B. Jackson, who carried on the business under the firm name of Wells, White, Richardson & Company. Messrs. Arnold & Jackson rented the Print Works from the new firm and continued printing until 1860, when Jackson sold his interest to Samuel Gaylord.

In 1863, W. W. Freeman, A. W. Richardson and W. S. Blackinton purchased the Eagle Cotton Mills and Print Works, and soon afterwards L. L. Brown purchased an interest and the firm became Richardson, Freeman & Co. In 1867, Mr. Richardson sold his interest and the firm name was changed to W. W. Freeman & Co. The property at this time included the cotton mill called the "Stone Mill," the Estes Mill, the Eagle Mill and the Print Works. The Print Works portion was gradually enlarged until it had reached a capacity of seven machines. In 1874, the firm name was changed to Freeman Manufacturing Company, which was later changed to Windsor Company.

The Windsor Print Works, the direct successor of the Windsor Company was incorporated January 15, 1907, with a capital stock of $1,000,000, and the plant was taken over and the work of improving and enlarging it begun. The works now cover nine acres, and consist of twenty-two brick and four frame buildings, with a floor space of 319,918 square feet, some fourteen tenements, and the Eagle Mill, a three-story brick structure, which was used for manufacturing until the company began to purchase its cloth from outside sources. It operates 15 printing machines and has a bleaching capacity of 35 tons of cloth daily. The equipment is capable of producing a wide range of fabrics. The napping of cotton flannel was first attempted in the United States at this plant, as well as the finishing of the finest and sheerest goods and percales in white and dyed ground effects.

The unit is a part of the Consolidated Textile Corporation, and is managed by Joseph Bennett, who has been active in its affairs for more than a quarter of a century, and who is one of the vice presidents of the concern. In normal times it employs 900 operatives.

THE JAMES HUNTER MACHINE CO.

The James Hunter Machine Co. began its eighty-first year of leadership in its fields by announcing in 1928, its latest product—the Hunter vacuum extractor.

This machine, designed especially for woolen and worsted wet finishing, is the latest of a series of new and improved machinery designed by Hunter engineers and built in the North Adams shops during a period of four score years.

In these 80 years the company has become a nationally famous firm —its machinery for woolens and worsteds, for mattresses and bedding, and for industrial drying of processed products being used from coast to coast. A recent partial survey of the woolen industry showed fifty-five machines made by the concern still in use, whose aggregate years

of operation were twelve hundred—a remarkable tribute to the construction policies of the company. Another survey shows forty-three of the leading woolen mills of the nation to be 75 to 100 per cent equipped with Hunter-made preparation or wet finishing machinery, with some Hunter machinery in over 75 per cent of all the woolen and worsted mills in operation.

During these many years the concern has expanded from the original small foundry, to two large plants covering 110,000 square feet of floor space, with capital of $500,000, and employing 250 persons in its engineering, designing, administrative, and manufaçturing departments.

In 1929 it began the erection of a substantial addition to its plant facilities for the purpose of providing a large erecting shop and to enable it to rearrange its manufacturing operations. The structure is of brick and steel, one-story high, 164 by 70 feet in dimensions, and to afford room for it a wooden storage shed was razed. The shop will be equipped with two large traveling cranes. The corporation, founded in 1847, affords a splendid example of sustained energy and prosperity by developing new fields and making original applications of machinery to keep abreast of the times. In addition to new types of textile machinery, including drying devices for various materials, machines for cleansing wool, for fulling cloth, for automatically working cotton waste and linters into mattress, automobile and upholstering felts, it has marketed successfully a line of bedding and mattress devices, and has expanded its sales by designing and producing special apparatus for furniture and automobile upholstery.

The most striking new development, however, has come through the manufacture of a needle felting or punching machine. Altogether the company produces forty-five distinct types of machinery, in some two hundred sizes and varieties.

Founded by James Hunter, in 1847, the fourth generation of the Hunter family is still active in the management of the concern. In 1857, the founder's son, James E., was admitted to the firm, and in 1891 the enterprise was incorporated, under its present name.

J. D. Hunter, grandson of the founder, is president, J. T. Hunter, son of the latter, is vice president, and G. C. Hadley is treasurer, of the corporation, which maintains a Boston office at 88 Broad Street.

THE ARNOLD PRINT WORKS

The Arnold Print Works is the logical development of all of the previous establishments and manufacturing activities which, since the very first settlement of the township, have been located in that portion of the city, where its plant lies. The tract of land at the junction of the north and south branches of the Hoosac River is the heart of the city of North Adams, if any section deserves that title.

The erection of the print works followed the original development of a mill, which was started in 1768 by Elisha Jones, as a convenience for the settlers. The site was set apart for the use of saw and grist mills and activities in fulling cloth, woven by the people in their homes.

In 1811 land was sold for the first local cotton mill to the Adams North Village Cotton Manufacturing Company. This unit was closely allied with the cotton manufacturers of Rhode Island, and the development in that state was followed in North Adams.

With the introduction of power machinery, expansion became marked until in 1862, the three partners, Harvey, Oliver and John Arnold obtained control, and erected a four-story building which was the initial structure

of the present print works. Four machines were installed, and the first piece of print cloth was finished in April, 1863.

The three brothers constituted an ideal partnership, in that Harvey Arnold was a natural executive and administrator, while Oliver possessed an intimate knowledge of the mechanical work, and John was an expert accountant and financier. For forty years they were considered to be the largest manufacturers of cotton goods in western Massachusetts.

During the period of the Civil War, business was profitable, but following the end of the struggle depression and panic set in.

On the night of December 27, 1872, the entire plant was burned to the ground, and the insurance was not sufficient to replace it. In 1873, Harvey Arnold, then an elderly man and in poor health undertook to rebuild the mill, a triumph of energy over adversity—neither fire, the deaths of his associates, nor panics serving to discourage this progenitor of the business. But the effort for the moment seemed to be ill-timed, as the panic of the period caused a suspension of operations.

Before the death of Harvey Arnold, which occurred shortly afterward, steps had been taken to reorganize the company under the name of the Arnold Print Works, and these were effected in October, 1876.

A. C. Houghton, a vigorous young man, born in the nearby town of Stamford, Vermont, acquired a large interest in the concern and under his leadership it was reorganized and developed and soon took rank as one of the best known print works in the country.

He secured the best managers and chemists available, obtained water power rights and privileges of great value and eventually the works comprised not only the greatly enlarged plant on Marshall Street, but a group of auxiliary mills extending through the Hoosac Valley to North Pownal, Vermont.

In 1882, William A. Gallup became treasurer, an office which he filled for more than forty years.

In 1883, the number of printing machines was increased to eight and the famous blue dip process was started. The work of dyeing blue by the indigo method grew by leaps and bounds and for many years required a large force of employees.

The plant continued to expand as new methods of printing were developed, and maintained its position of leadership in the industry of bleaching, dyeing, printing and finishing cloth.

The concern, now capitalized for $1,500,000 employs upwards of 1,300 operatives, and is the city's largest industry.

In 1928, the Arnold Print Works purchased that part of the then idle Renfrew Mfg. Co's plant, located in the Renfrew section of the adjoining town of Adams, representing the main or larger unit, and equipped it to produce the printed draperies formerly manufactured at the North Adams plant, thus making it possible to foster simplification and improvement at the latter mill, where the printing of materials for wearing purposes is now confined.

The expansion very materially increases the productive capacity of the Arnold Print Works, and gives the concern many decided advantages in organization, cost, quality and distribution through specializing in each plant.

Production was commenced at the Adams plant in March, 1929, and when all the equipment ordered is in operation, the increase over the capacity of the North Adams unit will be 75 per cent. Yardage finished up to the end of the company's fiscal year, which ended June 30, 1929,

was 20 per cent above the previous twelve months, and at the close of 1929 both plants were operating at capacity.

As of June 30, 1929, the corporation's current assets were $1,913,623, with current liabilities of $640,238, while its surplus stood at $2,504,397.

George B. Flood succeeded Mr. Gallup as treasurer. W. Z. White is assistant treasurer, Samuel M. Jones, president, Bruno Schmidt, vice president, and C. T. Phelps, secretary of the corporation.

The S. B. Dibble Lumber Company, has been serving the public in North Adams and vicinity since 1874 and is equipped with an extensive yard where a large stock of lumber is carried; also a mill where sash, doors, blinds, interior finish, store fixtures and packing boxes are manufactured, the concern being capitalized for $40,000 and employing 70 hands. W. B. Parmele is president, and Joseph A. Ranck, treasurer and secretary.

The Norad Mills were incorporated in 1924, and manufacture blankets, employing 150 operatives. The plant is also equipped with complete dyeing and finishing departments. E. G. Huggins is president, G. I. Davenport, treasurer, G. A. Kaschel, vice president, and James F. Bacon, clerk.

In 1925 the North Adams Garnetting Co., was incorporated and is engaged in garnetting pure silk, Joseph Bennett being president, A. S. Edson, treasurer, and Frank Bond, clerk.

In October, 1929, the Beaver Mills, which for some years before had employed 325 operatives in the production of cord tire fabrics, were purchased by the Sprague Specialties Company, of Quincy, manufacturers of electrical condensers, and which eventually will employ 1,000 workers in North Adams. The company was organized by Robert C. Sprague, and associated with him in the project are his brothers, Frank D. and Julian K. Sprague. The Messrs. Sprague are sons of Frank L. Sprague, one of the leading electrical genuises of Massachusetts, who resided in North Adams when a young man. The expansion program of the Sprague Specialties Company involves the recapitalization of the old Quincy concern, with North Adams financial interests, which raised $1,000,000 to provide the removal of the corporation from the Norfolk County city to North Adams.

Robert C. Sprague is president and treasurer of the concern, William R. Hurley, vice president, and William J. Nolan, secretary, and while in Quincy it employed from 75 to 250 operatives.

The Barber Leather Co., with capital of $100,000, employing 50 operatives in the manufacture of leather, insoles and chair seats, of which Archer H. Barber, is president, and Edwin A. Bond, treasurer; the Barber Tanning Co., at its plant in the village of Blackinton, employing 75, in tanning and currying, managed by A. H. Barber, president, George E. Cox, treasurer, and A. J. Buffum, vice president; the Blackinton Co., whose plant in the village of Blackinton, capitalized for $536,500, employs 350 hands in the manufacture of high-grade woolen and worsted fabrics, with John H. Waterhouse as president, and Albert J. Buffum, as treasurer; the H. W. Clark Biscuit Co., manufacturing crackers and cakes, employing 200 in its North Adams and Lowell plants, capitalized for $500,000 managed by H. W. Clark, president, F. L. Dillon, vice president, and C. Harold Isbell, treasurer; the Concordia Manufacturing Co., employing 50 in the manufacture of silk and novelty yarns; The Greylock Mills, Inc., plant, a branch of W. C. Plunkett & Sons Co., of Adams; the Hoosac Cotton Mills,

with capital of $1,350,000, employing upwards of 1,000 operatives in the manufacture of cotton and silk mixtures, managed by former United States Senator Hon. William M. Butler, as president; Morgan Butler, as vice president, James F. Bacon, as secretary, and H. M. Coxen, as treasurer, ranking as one of the largest and most successful of the local industries; the Lindale Mills, with capital of $150,000, employing 35 hands in the production of box board, operating a branch at Farley and managed by E. A. McMillin, president, and A. W. Chippendale, secretary and treasurer; The E. A. McMillin Co., capitalized for $25,000, employing 100 in the manufacture of cloth boards, with the same officers as those of the Lindale Mills; Joseph I. Melanson & Sons Corp., employing 300 in the production of women's, children's and boys' shoes, managed by Joseph I. Melanson, treasurer, L. J. Melanson, president, and Frank B. Morrow, secretary; the Wall, Streeter Shoe Co., capitalized for $210,000, employing 200 in the manufacture of men's welt shoes, managed by James E. Wall, president and treasurer; and the Weber Brothers Shoe Co., with capital of $600,000, employing upwards of 400 operatives, in producing men's Goodyear welt shoes, and managed by Alfred C. Weber, president, W. D. Rider, secretary, and William J. Weber, treasurer, constitute the remaining principal manufacturing enterprises of the city. In 1928 the Atlas Plywood Corporation opened its sixth assembling plant at North Adams.

The forty-seven industrial concerns in North Adams had a combined capital investment of $27,741,682 in 1927 and they produced commodities that year valued at $25,969,481.

There was expended $14,237,652, in 1927, for raw materials and $5,-451,802 was paid in wages to 4,692 employees. Textile production was by far the leading industry, the value of the products manufactured in the six cotton, woolen and worsted concerns aggregating $7,834,657. Boots and shoes came second, with a value of $2,091,022; bread and bakery products third, with $1,326,090; and foundry and machine shop products fourth, with $804,149; and printing and publishing fifth, with $317,706; while 21 miscellaneous industries turned out products valued at $13,595,857.

CHAPTER X

THE PLACE BERKSHIRE COUNTY TOWNS HOLD IN THE INDUSTRIAL SUN

The opening of the 19th century was the beginning of a new era in Berkshire County. It marked the passing of the old agricultural regime and the advent of the industrial age.

Of all the geographical divisions of Massachusetts, Berkshire County possesses the most valuable iron ores and the manufacture of this commodity was early commenced, the beds of brown hydrate of iron being numerous and extensive throughout the terrain, at the edge of the lower silurian limestone of the Berkshire Valley. The most abundant deposits were wrought in open quarries in West Stockbridge, Richmond, Lenox, Lanesboro, Cheshire, Tyringham, Great Barrington and Pittsfield, and they contained 30 per cent to 60 per cent metallic iron, some of them yielding 100,000 tons without showing signs of exhaustion.

Many of these units continued to operate and cared for local and vicinity needs for many years, and even today some still carry on.

Not only in iron ore is the Berkshire terrain celebrated, but it has long been known as possessing some of the most valuable marble and limestone deposits yet discovered, and as containing in its hills the finest quality of pure silex sand, which has no superior for glass making.

THE IRON HORSE CHANGED THE INDUSTRIAL PICTURE

Up to the coming of the railroads all of the Berkshire County towns were on a parity in so far as transportation facilities were concerned, and the more remote hill towns were able to successfully compete with their more favorably located neighbors in getting their products, whether natural or manufactured resources, to market, but the advent of the locomotive sounded the death knell to many of the municipalities, whose elevation was such that the iron horse could not traverse the excessive grades. So it was that while the Boston & Albany and the old Fitchburg railroads opened up a wider market for the products of the towns through which their rails were laid, the villages on the hills of old Berkshire found themselves marooned and unable to compete through the use of horse-drawn vehicles with the more rapid and less expensive freight service afforded by these two transportation agencies.

Gradually industry in many of these towns moved to more favorable locations served by the railroads and with them went many of the populace.

THE INDUSTRIES OF ADAMS

The town of Adams occupies a prominent place in the industrial life of the Commonwealth, because of the fact that it was there that one of the very earliest attempts to manufacture cotton cloth, by power machinery, was made, and at a period coincident with the Clinton, Waltham, and other pioneer enterprises of a similar nature.

Of all the early cotton factories, the W. C. Plunkett & Sons Co. is unique, in the respect that it is one of three textile concerns in Massachusetts that has been owned and controlled for more than 100 years by four successive generations of one family.

It seemed appropriate to treat the history of that unit—the corporate successor of the Adams South Village Cotton and Woolen Mfg. Co.,—as well as the story of its 41 years-old offspring,—the Berkshire Cotton Manufacturing Company,—in the chapter devoted to the rise of cotton manufacturing in Massachusetts, rather than to carry these summaries in this section of the work. The Plunkett unit was not incorporated until 1920, having operated for upwards of a century as a partnership. It has capital of $400,000, and the plant is equipped with 20 sets of cards, 10,000 ring spindles, 2,500 twist spindles, and a complete dyeing department.

The Berkshire Cotton Mfg. Co. has capital of $5,000,000, and the plant has 6,541 looms, 122,290 ring and 136,729 mule spindles, and 23 boilers.

In 1830 Adams had 15 factories, twelve producing cotton goods and three woolen fabrics, and at that period the former produced annually 1,065,000 yards of sheetings and shirtings. The Wells, Blackinton & White woolen mill was equipped with nine looms and produced 52,000 yards of satinets annually; David Estes & Son had seven looms and wove 20,000 yards, and Ingalls, Wells & Burke operated six looms, and produced 30,000 yards annually.

ADAMS BROTHERS MANUFACTURING COMPANY

The Adams Brothers Manufacturing Company, makers of cotton warps and yarns, is the outgrowth of a small mill, erected on the Hoosac River, in 1846, by Washington Adams and John M. Seeley to meet a demand for cotton cloth, the original firm name being Adams & Seeley. On the death of Mr. Adams, in 1851, the business passed to his sons, George Washington and John Seeley Adams, and the business was continued as Adams Brothers.

In 1863, Henry Harrison Clark was admitted as a partner and the firm became Adams & Clark. That year, the manufacture of cotton cloth "sheetings" ceased and equipment was installed to make white, colored and fancy cotton yarn and warp exclusively. In 1867 the firm became Adams Brothers & Co., and in 1891 the business was incorporated as Adams Brothers Manufacturing Company with George W. Adams as president, John S. Adams as vice president, and George B. Adams, son of the president, as treasurer and general manager. On the death of the president, in 1892, John S. Adams became president, which position he held until his death, in 1903. In 1904, William T. Adams, the second son of George W., was elected president; John S. Adams, Jr., son of the late president, was chosen vice president, and George B. Adams was elected treasurer. The management continued in the hands of these officers until the death of the latter, in 1926. At that time John S. Adams, Jr., was elected president and superintendent, and William T. Adams, treasurer and vice president.

The mill was enlarged in 1863, 1895 and 1905, the present weekly capacity being 30,000 pounds of colored and white cotton yarns.

The concern was incorporated in 1928, with $200,000 capital, and the plant is equipped with nine sets of cards, 47 broad looms, 2,808 woolen and 460 twist spindles, two boilers and a water-wheel.

AN OLD ESTABLISHED PAPER MILL

The L. L. Brown Paper Company of Adams commands a prominent place in the fine paper industry not merely because of its age—the concern having been established in 1849—but more especially because it has been making quality papers exclusively for more than three-quarters of a century.

To this company also belongs the enviable record of never having used a scrap of colored rags in its products. Since the original partnership was established 81 years ago, none but white rags have been employed, and today it is the only company making ledger, linen and bond papers whose consumption of rags is exclusively confined to white clippings.

The L. L. Brown mills were founded primarily for the manufacture of permanent record papers, and have specialized in them ever since, the



UPPER MILL, L. L. BROWN PAPER COMPANY, ADAMS

products being used extensively for public and commercial records, as well as for stationery and important documents of all kinds.

The founders were Levi L. Brown and his uncles, Daniel and William Jenks. The mill in which the new enterprise began operations in those early days consisted of a small brick and wooden structure, occupying part of the site of the present main plant of the company, and the productive capacity was limited to 1,000 pounds a day. However, this parent mill was well equipped, according to the standards of the day, and, as with the present units, was geared for quality primarily.

The type of the output rapidly won widespread recognition, with the inevitable result that another building was needed in a short time, and a large stone cotton mill nearby was acquired, which was remodeled for paper manufacturing. This unit, greatly enlarged and modernly equipped, is now known as the Upper Mill.

In 1871 the original structure was remodeled and greatly enlarged. In 1873 the concern was incorporated as the L. L. Brown Paper Company,

with Levi L. Brown as the first president and T. A. Mole as treasurer. While the company has always specialized in ledger paper, its products also include other lines, notably linens, bonds, parchments, onion skins, exchange cap, manuscript covers and typewriter papers.

For many years the concern had the distinction of being the only mill to manufacture genuine, hand-made paper on a commercial basis, for de-luxe editions, engraved and embossed cards and other exclusive uses.

While preserving the traditions on which the company was founded and the spirit of personal craftmanship which characterized it from the beginning, the enterprise has always been among the most progressive in policies and methods, and its record forms an interesting study in contrasts. There one sees the same conscientious care and thoroughness



LOWER MILL, L. L. BROWN PAPER COMPANY

which formed the nucleus of the enterprise 81 years ago flourishing alongside the most modern and up-to-date equipment and methods.

The present officers of the company are: Arthur B. Daniels, president, who has been identified with the enterprise since 1878; A. Millard Daniels, treasurer, and Rupert B. Daniels, secretary.

The town has two sizable lime manufacturing units—the Hoosac Valley Lime Co., with capital of $50,000, employing 50 operatives, and managed by William Flaherty, president; George B. Wood, treasurer, and M. K. Christie, secretary and assistant treasurer; and the New England Lime Company, capitalized for $2,888,000, whose headquarters are in Pittsfield, but the corporation maintains lime quarries at Adams and Rockdale.

In 1928, the plant of the Adams Woolen Co., which had been closed for

five months, was purchased by Arthur Bronstein, of New York, and during a portion of the time since has operated on a day and night schedule.

The same year, the idle plant of the Berkshire Hills Paper Co. was bought by the Eaton, Crane & Pike Co., of Pittsfield, and a new corporation was organized to operate this unit.

Organization of a new concern was effected in September, 1928, under the name of Berkshire Paper Co., to take over the watermarks, brands and trade names of the former Berkshire Hills Paper Co., and the manufacture of paper was begun in one of the units formerly owned and occupied by the Renfrew Mfg. Co. The same year, the Arnold Print Works, of North Adams, purchased the greater part of the then idle brick plant of the Renfrew Mfg. Co., installed a large amount of new machinery, and began producing print goods, auxiliary to its main factory in North Adams.

In 1929 the Parraas Flooring Co. was formed by Messrs. Leander and J. L. Parrott, both of Adams, and Arthur A. Smith, of North Adams, and placed on the market a finish flooring as a substitute for granolithic cement and tile floors, the process involving a secret European mixture affecting the bonding quality, and being water, fire and dustproof.

In 1927 the 21 manufacturing establishments in Adams used stock and materials valued at $5,005,417, employed 3,000 workers to whom were paid $3,131,302, in wages, and manufactured products valued at $9,946,628.

ALFORD AND BECKET

Alford, located on the Seekonk River, was favorably regarded in early times as furnishing excellent sites for grist, saw, chair, trip hammer, tannery, iron and lime quarry units, but today it is a purely agricultural community.

Becket at one time had 18 sawmills, numerous grist mills, a carding and cloth dressing factory, a chair plant, and, in the early part of the 19th century, two tanneries were operated there. In 1841 another tannery was started and in 1848 a tanning unit was established which continued operations until 1880, when production ceased on account of the exhaustion of the local lumber supply for which the bark used in the operations was employed. At one period this concern tanned as high as 50,000 sides of upper leather, production being maintained at this rate for more than 20 years.

It was in 1857 that Bulkley, Dunton & Company, of New York, built their paper mill on the Becket side of the river, opposite the Middlefield station, now known as the Union Mill, where paper wadding is manufactured, the concern employing 35 men, and being capitalized at $48,000. Jonathan Bulkley is president, Franklin A. Stone, treasurer, A. J. Thompson, clerk, and Joseph Godwin, secretary.

Today, one of the principal industrial establishments in the town is the basket manufacturing plant of M. E. Ballou & Son, which gives employment to 100. Up to the disastrous flood of November, 1927, one of the smaller units of the Collingbourne Silk Mills was operated in Becket, but practically all of the buildings, save a store house, were swept away by the waters, and a few weeks later this building was destroyed by fire.

Becket's six manufacturing plants had a total capital of $326,663 in 1927, used stock and materials valued at $231,276, paid 114 workers $112,433 in wages, and marketed products valued at $422,846.

CHESHIRE MADE THE FIRST PLATE GLASS EVER MANUFACTURED IN THIS COUNTRY

When fine glass-sand beds were discovered within the limits of the town of Cheshire the Cheshire Crown Glass Works were established in 1813, but the promoters were unaware that they had erected their plant on as fine a bed of glass-sand as has been found in the United States, and they drew their raw material from another deposit located some three miles distant. The enterprise proved unsuccessful, but for many years thereafter glass was made from Cheshire sand, at Sand Lake, N. Y., and Keene, N. H., the local product being 99 per cent pure sand, with no superior for glass making.

In 1847 another local glass works enterprise was started in the village of Berkshire in Cheshire and a still larger plant was erected in 1853. The Cheshire Glass Co. was organized in 1849, with $25,000 capital, and manufactured window glass, and four years later the first plate glass ever produced in the United States was turned out. Later, this company removed to Lenox, where it operated as The Lenox Rough Plate Glass Co.

Iron ore was discovered in the mountains of the town and in 1848 James N. Richmond, George M. Wells, Russell C. Brown and others formed the Cheshire Iron Works, with capital of $200,000.

In 1855 a large saw and stave mill was built and barrels were manufactured there for years.

In 1879 the Berkshire Glass Sand Company was formed, which is still in operation, its plant being located in the village of Farnams. C. J. Curtin is president, T. J. Curtin, Jr., secretary, and T. J. Curtin, treasurer, and some 20 operatives are engaged in harvesting the sand that enters into glass production.

In 1885, Cheshire had a cotton factory, while a plant where tanning operations were carried on had been changed into a shoe factory.

CLARKSBURG

Brick yards, a wool-carding mill and three powder mills constituted the earlier industries of the town of Clarksburg.

In 1829 four factories had succeeded the grist, saw, wooden bowl and calico box mills of an earlier date. In 1866 a brick woolen plant was built in the village of Briggsville, and later under the name of the Linwood Woolen Company cassimeres were turned out, the concern employing at one period 100 hands and operating eight sets of cards.

THE DAM THAT DEFIED HIS SATANIC MAJESTY

The first settlements in the Berkshire Hills were made in the decade between 1750 and 1760.

As the colonists entered from Connecticut, following the Housatonic Valley, and worked their way north, they observed the beautiful valleys heavily wooded and swampy. Fearing malaria, with which they had had dire experiences in southern Connecticut, they founded their original villages on the tops of the broad rolling hills.

The original settlement of Dalton was no exception and the beautiful valley in which the modern town lies remained unclaimed for a long period of time.

About 1790 the needs of the settlers brought about the erection of a sawmill and grist mill, located at the upper end of a gorge called Dalton Jams.

Through this sawmill passed most of the timber (white pine) which grew in the valley and with the disappearance of the trees the real settlement began.

By 1840 the timber line had so far receded, new sawmills meanwhile springing up nearer the sources of supply, that the village mills had been virtually abandoned.

Beginning about 1800 a series of paper mills had been built along the Housatonic River below the Dalton Jams.

In 1824 Thomas Carson, a son of David Carson, who, with Joseph Chamberlin and Henry Wiswell, was part owner in the second paper mill built in Dalton, decided to embark in the business of paper making and chose a site about three-quarters of a mile up stream from his father's mill, and erected a plant which he called the Aetna. Later it was called the Housatonic, and, finally, in the early '40s received the name Defiance, which it still bears.

This final rechristening came about in a rather interesting way.

During the course of its construction local opinion was openly pessimistic and the "old timers" were unanimous in declaring that the new dam would not outlast the spring floods of the following year. This "Croakers' chorus" finally reached the ears of the "imported" engineer and, when the structure was completed, he took occasion to announce that "the dam was built to stay and he defied the Devil himself to move it." This rash declaration created a profound sensation in the village. The structure immediately became known as the Defiance Dam and, in a short time, the mill that it served also bore the same name.

In spite of the engineer's terrible imprecations and the fearful forebodings of evil by the townspeople, the old dam stood firm against floods and freshets for over 40 years and only ceased to perform its allotted task when Byron Weston built a larger stone structure just below it for the purpose of impounding more water.

In 1840 Mr. Carson sold the Defiance Mill to Henry Chamberlin, who, with his son, Ezekiel, ran the mill until the latter's untimely death. Mr. Chamberlin then turned the management over to his nephews, Burr and Albert Chamberlin.

In 1863 Burr Chamberlin, then the sole owner of the Defiance Mill, sold it to Capt. Byron Weston, who immediately began the manufacture of the ledger paper that was soon to be nationally famous as Byron Weston Company linen record paper.

The immediate success of this product forced Mr. Weston to enlarge his plant, and, in order to continue uninterrupted service, he started a new stone mill, enclosing the old plant. One entire side of this new structure collapsed while still in the hands of the contractors. When the stone building was entirely removed a brick plant was substituted.

When this building was completed and ready for operation, the old wooden mill was torn down, and the production of Weston's linen record went on, almost without interruption, and this same brick building is the nucleus around which the modern Defiance Mill has been built.

At the close of the Civil War, Gen. William Francis Bartlett, a man who had attained nation-wide fame as a valiant leader in the Union Army, and as a brave and knightly opponent, gave up his commission and returned to Berkshire County, whence, four years before, he had gone as colonel of the Forty-ninth Massachusetts Regiment of Infantry.

Soon after his homecoming, General Bartlett, in partnership with his

brother-in-law, Col. Walter Cutting, bought the paper plant built by Mr. Chamberlin, and operated it as a writing paper mill.

In 1875 the plant burned and General Bartlett, his health broken by his long war service, did not feel equal to the task of rebuilding. Meanwhile the demand for Byron Weston's linen record paper had become so widespread and the need for expansion so pressing that Mr. Weston bought the property from his friend and Civil War comrade, and immediately began the erection of a larger mill of brick. This plant was completed in 1876 and was named the Centennial Mill, in tribute to the year in which it was built and because Mr. Weston's product had been so signally honored at the Philadelphia exposition.

This factory, with its numerous additions, now constitutes the second unit of the Byron Weston Company's plant, and it is an interesting fact that several of the employees of the old Bartlett & Cutting Mill are still "carrying on" with the Byron Weston Company.

When the Centennial Mill was completed, the Byron Weston Company possessed two 66 inch paper making machines, which were continued in operation until 1910, when a large extension was made to the Centennial plant, and an 84 inch machine was installed.

Developments continued until 1927, when another addition was made to the Centennial Mill and the most up-to-date 112 inch Fourdrinier machine was installed, the largest ever put into operation for the manufacture of the highest grades of ledger papers.

In the old days, when paper was made by hand, and even in the early days of the machine-made product, the use of paper was so limited and all production was so carefully conserved that it was not difficult to obtain an adequate supply of clean, pure water for its manufacture. After the paper machine was perfected and power was required to operate a mill, the same water that turned the mill wheel was used as the medium for washing the rags and for holding the rag fibres in suspension as they started on their journey over the wire of the paper machine.

The use of these streams by other types of factories eventually drove paper-makers to search for new sources of supply for pure water and for a long time neighboring springs in Dalton were found sufficient.

By the middle of the nineteenth century the demand for paper had become so great that the water problem again became acute, especially with mills specializing in high-grade rag papers.

Prior to 1880 Byron Weston had piped all the available spring water to his plant and the constantly growing demand for his product warned him that if his business was to grow further he must seek new sources of supply. There was also an equally cogent reason why a new and cleaner source should be sought.

The use of surface water, even when piped from springs, was rendered difficult because spring freshets and storms at all seasons of the year filled it with mud and dirt. Old paper-makers, when in a reminiscent mood, assert that a clap of thunder would bring a mill owner or superintendent out of his bed in the middle of the night and hurry him down to the plant to see what could be done to overcome roily water, which was sure to follow a storm.

PIONEERING IN ARTESIAN WELLS

The business of drilling for water was in its infancy at the time, but Byron Weston, a pioneer in more than a few of the processes of modern paper-making, determined to try the new method, and in 1880 he sank a

12-inch well. During the process the work was watched with the greatest anxiety, but in the end Mr. Weston was rewarded for his faith and initiative by tapping a "gusher" which was christened "Bonanza" and which flowed at the rate of 500 gallons a minute. This artesian water was not only a fine addition to his existing supply but, upon chemical analysis, it was found to be of such purity as to render it ideal for use in paper-making. The great depth from which it comes is shown by the fact that it maintains an even temperature of 48 degrees Fahrenheit during the entire year.

As soon as the flow of water was proved to be constant, other sources of supply were abandoned and Bonanza well water was used exclusively for internal mill use. Meanwhile the steadily increasing demand for the company's paper and the incidental increase of production soon rendered the flow from this well inadequate and, in succession, other wells were drilled until, in 1909, one driven through solid rock to a depth of 600 feet brought a flow of 800 gallons per minute—the greatest of all.

This chemically pure water solved some of the most baffling problems connected with the manufacture of the best rag papers and the uniformity of color and immaculate whiteness which distinguished the Byron Weston Company's products are to be attributed, in a great part, to the use of artesian wells.

The company now owns and uses seven wells, which supply 1,500 gallons of the purest water every minute, to the various departments of the mills.

In 1911 Philip Weston, president of the Byron Weston Company, developed and patented the now famous Weston made-in-the-paper-hinge, which practically revolutionized the loose leaf business.

In 1927 the company added a new machine room, 65x106x25 feet, to its Centennial Mill, which embodied all the latest ideas in factory construction, including the saw-tooth roof with north lighting, and a new 112-inch Rice Barton & Fales paper machine was installed.

From one small machine which cost less than $5,000 in 1865 the plant has expanded to include one 66-inch machine, one 84-inch machine and one 112-inch machine, with a total capacity of 20,000 pounds of paper every twenty-four hours. In the past ten years the entire plant has been completely modernized.

The Byron Weston Company has capital of $400,000, and employs 250 operatives. Philip Weston is president, Donald M. Weston treasurer and Brenton C. Pomeroy, secretary.

THE COMING OF ZENAS CRANE

Immediately following the treaty of 1783, with England, the localities in which manufactures had been established saw their local interests endangered by foreign competition, and there began the development of new concerns.

Stephen Crane's home was located on the banks of Ponkapoag Brook, just above its junction with the Neponset River, and near the Milton paper mill. It was in this environment that his sons, Stephen, Jr., and Zenas, grew to young manhood. Stephen Crane, Jr., learned the trade of paper-making in the Milton mill, and later established himself in a plant on the Charles River, at Newton Upper Falls. It was here that Zenas, who was eleven years younger than his brother, was regularly employed, and here that he acquired the rudiments of the art of paper manufacture. From there he went to Worcester, where he was associated with General

Burbank, an exacting and severe taskmaster, but one of the most skillful early exponents of paper production. Zenas Crane profited from Burbank's rigid discipline, and in the summer of 1799 he set out, on horseback, in quest of a location for a mill, visiting en route the plant at Springfield, established probably by Eleazer Wright, prior to 1788, and which afterwards became the property of David Ames, and his sons.

Pushing on through the hills of Berkshire and along the winding, narrow valley of the Westfield River, possibly following the old Indian trail, known as Unkamet's Path, this ambitious, fearless and earnest twenty-two years-old son of Massachusetts finally reached the town of Dalton, where he found the requisites necessary for a successful paper mill plant—water power that could be controlled and that would be sufficient to drive the equipment; an abundant supply of pure water for cleansing the rags and preparing the pulp; a surrounding region which seemed likely to provide at low prices an ample supply of rags, and a potential sales market that would take care of the production of writing, printing and wrapping paper.

At that time, Berkshire County had a population of about 34,000 people, and Albany, N. Y., then a growing center, lay but thirty miles distant.

HE AND HIS ASSOCIATES BUILD BERKSHIRE'S FIRST PAPER MILL

In 1801 the pioneer paper mill of Berkshire County was erected by Zenas Crane, Henry Wiswell, and John Willard, some 14 acres of land



OLD RED MILL, BUILT IN 1810 AND BURNED IN 1870, AND STONE MILL BUILT ABOUT 1840, OF CRANE & COMPANY, DALTON

being bought of Martin Chamberlin, for $194. The first structure stood on the site of what is today the old Berkshire Mill. Its main part was two stories high, the upper portion being used as a drying loft. It had a daily capacity of twenty "posts," a post being 125 sheets, making the total output per day between 100 and 125 pounds.

An engineer, to whom was paid $3 a week, had charge of the power, while a vat man and coucher, who each received $3.50 a week, with a lay boy, who acted as a helper, and who was paid sixty cents a week and board, with one other male employee and two girls, who each received 75 cents per week and board, and who handled the finished paper, constituted the force of employees, in addition to Mr. Crane, who, a few years later was paid by the partners at the rate of $9 a week.

The process of manufacture consisted of dipping a square frame, covered with a wire screen, into a vat filled with liquid pulp, and in shaking down the latter into a flat sheet, while the water was allowed to drain off through the screen. Each sheet was made by hand and one at a time.

Securing rags for the mill was a problem and the promoters resorted to advertising, early in 1801, by inserting the following announcement in the *Pittsfield Sun*:

Americans !

Encourage your own Manufactories, and they will Improve.

LADIES, ſave your RAGS.

AS the Subſcribers have it in contemplation to erect a PAPER-MILL in *Dalton*, the enſuing ſpring; and the buſineſs being very beneficial to the community at large, they flatter themſelves that they ſhall meet with due encouragement. And that every woman, who has the good of her country, and the intereſt of her own family at heart, will patronize them, by ſaving her rags, and ſending them to their Manufactory, or to the neareſt Storekeeper—for which the Subſcribers will give a generous price.

HENRY WISWALL,
ZENAS CRANE,
JOHN WILLARD.

Worceſter, Feb. 8, 1801.

In 1810 Zenas Crane purchased the interest of his two partners and, until his death, in 1845, was the sole owner of the paper mills at Dalton.

Transportation was a serious problem in these early days. The territory lying within the limits of this Commonwealth was then less within the knowledge and reach of the merchant seated in his Boston counting room than the whole world is today. The Berkshire Hills manufacturer of 1929 can receive and respond to an order for his goods from South Africa with greater ease and promptitude than his predecessor in 1810 could have done had the request come from Boston.

When we analyze the serious problems of these early pioneers, we realize how essential was the indomitable spirit of men like Zenas Crane in building the foundation on which the wonderful industrial development of the United States now rests. It required courage, patience, and endurance as well as experience, to establish the paper making industry in the rugged Berkshire Hills, and the tremendous development of Crane & Company in later years stands as a monument to the vision and enduring power of Zenas Crane.

Three years before his death he transferred his paper making interests to his two sons, Zenas Marshall and James B., and when the former died, in 1877, and the latter followed in 1891, the conduct of the business passed to Zenas, Jr., and Winthrop Murray, sons of Zenas M. Crane, and Frederick G., son of James B., and subsequently to their sons, who today represent the fourth generation from Zenas Crane, the pioneer.

THE CONCERN OFFERS A DISTINCTIVE PAPER FOR BANK NOTES

While bank note paper has always been a specialty with Crane & Company, it was not until 1844 that a distinctive paper for bank notes was made. This type had linen threads incorporated in the sheet which ran lengthwise of the note.

In 1879 Crane & Company secured the first exclusive contract for furnishing the United States government with all its paper for currency and securities, a contract that has been continuous for fifty years.

From 1879 to 1891 the distinctive feature was colored silk threads running lengthwise in the notes. From 1891 up to date a mixture of blue and red cut silk is scattered in two lines through each note. A new, distinctive paper was evolved by the company for the smaller size notes, which the Treasury Department placed in circulation on July 1, 1929.

ONE OF THE EARLY THRIFT CAMPAIGNS

The advance in the art of paper making in Massachusetts is shown by the fact that when, in 1801, at the very dawn of the nineteenth century,



GOVERNMENT MILL, CRANE & COMPANY, DALTON

Zenas Crane, Henry Wiswell and John Willard, of Dalton, set up in that town the first paper mill they were perfectly satisfied to produce, between 1802 and 1807, about twenty tons of paper annually, a quantity that today is less than that turned out by a single modern paper making machine in twenty-four hours. Even as late as 1855 the "Old Berkshire" Mill, as it was then known, had a yearly capacity of but 180 tons. One of its successors in the Connecticut Valley region is today able to manufacture on an average machine twenty-two tons of paper every twenty-four hours—the usual operating time (with three eight-hour shifts), that prevails in our paper mills.

The Dalton plants of Z. and W. M. Crane, Inc., Crane & Company, Inc., and Byron Weston Company, employing in the aggregate more than 1,000 workers, turn out daily sixteen tons of writing, besides bank note, bond and ledger papers in enormous volumes.

In addition to the bank note paper manufactured by the Crane units for the United States, it also produces government bond paper for seven-



PIONEER MILL, CRANE & COMPANY, DALTON



OLD BERKSHIRE MILL, CRANE & COMPANY, DALTON



BAY STATE MILL, Z & W. M. CRANE, DALTON

teen other nations in the world, and its bank note paper is used in twenty-two countries representing an aggregate population of more than 500,000,000.

As the United States Bureau of Engraving and Printing is turning from its presses more than one billion notes yearly, this business constitutes an item of major importance to Dalton. The growth of the company's business—and of the use of paper money, too—is illustrated by the fact that in 1890 only a ton and a half of paper was made at its plants in a day. Three-quarters of a ton a day was the production of bank note paper. The business has increased eight times in thirty-five years.

Dalton is unique in the industrial annals of Massachusetts in that this picturesque little town furnished the Commonwealth with two noted citizens—the late Honorable Winthrop Murray Crane, who successively served as lieutenant-governor (1897-1900), governor (1900-1903), and United States senator (1904-1913), and the late Honorable Byron Weston, who served his state as lieutenant-governor from 1880 to 1883. Both were prominently identified with the paper industry of Berkshire County.

When Senator Crane died on October 2, 1920, ex-President Calvin Coolidge said of him: "He inspired the love of all who knew him. In the affection of his fellowmen, he stood first in Massachusetts. It is, no doubt, a commonplace to say our Commonwealth will never be the same without him; but his loss will be felt in a way that will not be commonplace."

Murray Crane was one of the sons of the Bay State whose example is worthy of emulation. Attending the public schools of Dalton, and, for a brief time Williston Seminary, at Easthampton, he never aspired to a college education, and, at the age of seventeen, he informed his father, Zenas M. Crane, that he was ready to begin the business of paper making. The senior Crane, a devotee of thoroughness, placed his son in the rag sorting room—the lowliest, most menial and unpleasant job in a paper mill. Becoming a good rag sorter, Murray Crane graduated to other departments as the years went by, and ere long he knew the art of paper making from the rag to the finished product. That was why he was not only a successful paper manufacturer, but a beloved governor and senator.

Crane & Co., Inc., employs upwards of 500 operatives in its plants in Dalton, Pittsfield, and Westfield, and has capital of $3,000,000. Winthrop Murray Crane, Jr., is president, Frederick G. Crane, Jr., treasurer, R. C. Pierce, secretary, and Zenas M. Crane, vice president. These four constituting the board of directors.

Z. and W. M. Crane, Inc., of which concern Z. Marshall Crane is president, Winthrop Murray Crane, Jr., vice president, and William G. O'Connell, treasurer and clerk, is engaged in the manufacture of writing paper, and employs 300 operatives. The corporation has capital of $1,800,000 and its operations and management are closely identified with Crane & Co., Inc.

The textile industry, so prominent in Berkshire County, has one of its important units in Dalton, in the plant of Sawyer, Regan & Company, capitalized at $200,000, where 150 employees are engaged in the production of high grade fancy woolens, the concern maintaining its selling office in New York City. Cornelius H. Regan is president, John W. Crowther, secretary, and Charles F. Sawyer, treasurer. The dressing of cloth was begun in Dalton, by Ezra Maynard, in 1801, the same year the local paper industry commenced operations. In 1814, the first woolen mill built in the town was erected by Rev. Isaiah Weston, for the manufacture of broadcloths. Here we find an instance of a clergyman who had served as the

pastor of the Fairhaven Unitarian Church, and as collector of the port of New Bedford, under the Madison administration, turning to industry. In 1836, the Ashuelot Woolen Co. was incorporated at Dalton, with $50,000 capital.

Dalton had eight manufacturing establishments in 1927, capitalized at $5,428,526, used stock and materials valued at $2,259,260, employed 849 workers to whom were paid $937,448 in wages, and manufactured commodities valued at $5,340,701.

EGREMONT'S EARLY MARBLE QUARRIES

The history of Egremont's early saw, grist, fulling, dressing, chair, coach and wagon axle plants is lost in oblivion, but from the Goodell quarry in that town came the marble used in the columns and architraves of Girard College, Philadelphia.

Prior to 1845, Benjamin Cole built a carriage factory, at South Egremont, where he produced fine coaches.

The little town of Florida, where, in 1855, fourteen sawmills, several grist mills, a machine shop, a tannery and later on a pulp mill flourished, with the latter possessing 620 horse power and turning out 17,000 pounds of pulp every twelve hours, during the '80s, now has no manufacturing. Here was a case of utilizing for a time the power unit set up for boring the Hoosac Tunnel, as the engineers used this quantity of power for several years in operating the condensers that were required while the big hole was being bored.

GREAT BARRINGTON EXPERIMENTS WITH "INDIA RUBBER"

From the earliest times Great Barrington has been famous for industrial pursuits, a fulling and cloth dressing mill, set up in 1760, and Oliver Watson's grist mill, established in 1773-4 being among the first units, followed by the establishment of wagon manufacture, in 1805, and by a tannery in 1809. As early as 1816 a wool carding and cloth dressing establishment was set up.

In 1828 a cotton factory came into being, which was operated until 1868 when it was destroyed by fire, and in 1835 the Green River Manufacturing Company was formed, for the manufacture of satinets, but it proved to be an unsuccessful venture.

In 1833-4 a blast furnace was erected for the production of pig iron and later was taken over by the Richmond Iron Works. In 1835 the Housatonic Mfg. Company was formed for the manufacture of print cloths, but it failed in 1848. The plant was taken over two years later by the Monument Mills, which has successfully carried on operations in Great Barrington for almost 80 years.

In 1837 a second cotton mill was started, and was operated for ten years thereafter when it was changed to a shop for the production of chairs.

In 1847 one of the initial attempts made in Massachusetts to manufacture "India Rubber" goods was undertaken in the town by the Day Rubber Company. Marble and blue limestone quarries were formerly operated with great success in Great Barrington over a considerable period, and today the Berkshire Hills Company, capitalized for $125,000, employs sixty men in its lime operations, the factory being located in Sheffield and the office in Great Barrington.

THE B. D. RISING PAPER COMPANY

It is a curious fact that in a square about fifty miles on each side—east of New York state, and north of the Connecticut line—located in western Massachusetts, the great bulk of the finest papers, not only in the United States but in the world, are produced.

Exceptionally pure water, technical skill of paper-making families whose members have devoted themselves for generations to this work, close proximity to large sources of supply for material and large markets for the finished goods, largely account for this situation.

In 1858, Messrs. Owen and Hurlbut purchased a wooden building that had been erected by Henry L. Potter, and in which paper-making machinery had been installed, and four years later they formed the Owen Paper Co., which for twenty years or more thereafter produced high grade products, first prize being awarded its paper at the Centennial Exposition, at Philadelphia, in 1876.

In the last year of the nineteenth century, B. D. Rising purchased the plant that had been erected by the old concern, a few years before, and formed the B. D. Rising Company, which ultimately became capitalized for $1,000,000, and took rank as the second largest local employer of labor, upwards of 250 operatives being carried constantly on its payrolls. Its specialties are rag papers, including bonds, linens, ledgers, wedding Bristols, and announcement papers.

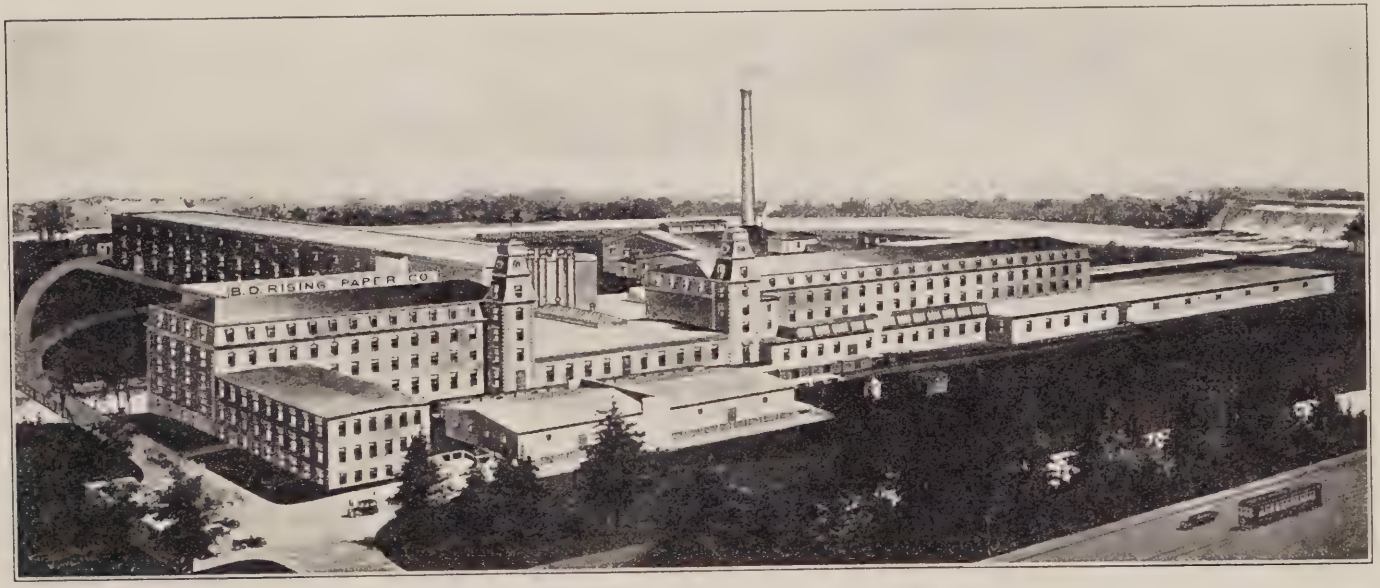
Bradley D. Rising began his career as a clerk and salesman in the employ of the Southworth Paper Co., of Mittineague, and three years later he became treasurer of the John H. Southworth Paper Co., of South Hadley Falls.

In 1872 he returned to Mittineague, and became treasurer and manager of the Agawam Paper Co., continuing in these capacities until the absorption of the concern by the American Writing Paper Co., in 1899.

In the late fall of 1928, the Strathmore Paper Co., of Mittineague, acquired the majority control of the stock of the company, but the concern continues to be operated under its corporate name, with Walter J. Raybold, as president, Col. Benj. A. Franklin, as first vice president, Thomas C. Bower, as second vice president and general manager, and Horace A. Moses, as treasurer, and is employing about 300 men and women. In 1929 a three-story brick and steel addition, 52 by 50 feet, was built, and new boilers and fuel economizers were installed.

GREAT BARRINGTON'S LARGEST ENTERPRISE

The Monument Mills, of Housatonic, began operations in 1850 in a small yarn mill, later purchasing the Waubeek Manufacturing Company, the two concerns being combined, and eventually engaging in the manufacture of bed spreads, which, with cotton yarns and warps, and bleaching and dyeing, constitute the products of the present day. Decade by decade large plant extensions have been made until today the mills are equipped with 40,000 spindles, 280 looms, and employ 800 operatives, also owning 130 tenements, three business blocks, halls, etc., as well as three developed and one undeveloped water powers, the two upper locations furnishing not only power and light for the plant, but for practically the whole of Berkshire County, south of Pittsfield. John H. C. Church is president and treasurer of the corporation, T. Ellis Ramsdell, vice president and agent, Delano deWindt assistant treasurer, and Thomas S. Ramsdell, secretary.



THE MILLS OF THE B. D. RISING PAPER COMPANY, HOUSATONIC

The corporation has a capital of $1,500,000.

The Berkshire Coated Paper Co. is another Massachusetts product of the first quarter of the present century, having been incorporated in 1922, for the manufacture of fancy coated papers, the president and treasurer J. H. Whitehouse, having been connected with the paper industry of this Commonwealth for half a century. The corporation has capital of $75,000 and employs 25 hands.

The Great Barrington Manufacturing Co., incorporated in 1917, is capitalized for $75,000, and employs 100 operatives, in carrying on bleaching, finishing, and the manufacture of cotton piece goods, sheetings, bedspreads, and pillow cases. The officers are Henry McCusker, president; Albert S. Pratt, vice president; Fred L. Bottum, treasurer, and William F. Flaherty, secretary and assistant treasurer.

A local concern that has enjoyed the greatest growth during the past decade is the Stanley Insulating Company, with capital of $625,000, employing upwards of 200 operatives, in the manufacture of all metal vacuum bottles. It has made many additions to the original plant, the latest in 1928, when a new enameling unit was constructed. A. G. Kimball is president, H. P. Tobey, secretary and treasurer, and Harry A. Kernell, vice president of the corporation.

In 1927, Great Barrington's seventeen manufacturing concerns had invested capital of $6,897,295, used stock and materials valued at $1,885,966, paid 870 workers $932,477 in wages, and manufactured goods valued at $3,704,280.

THE INDUSTRIES OF HANCOCK, HINSDALE, AND LANESBORO

The industrial products turned out in Hancock in earlier times included brooms, tubs, pails, wagons, nails and lime, and today the firm of E. B. Estes & Sons, capitalized at $750,000, employs 150 men in manufacturing many types of wooden products.

A second industry that is fed from the hills of Hancock is the gunpowder business, the corded piles of black alder sticks one observes on both sides of the local highways being stripped of their bark and permitted to season before being shipped to Schenectady, N. Y., where they are converted into the filling of cartridges.

In 1831 Charles H. Plunkett, probably the most public spirited citizen that the town of Hinsdale knew in the nineteenth century, established his first woolen mill, which was followed by the erection of a second unit in the lower valley, and later by a third, when he bought the Aaron Sawyer tannery and erected the so-called Middle Mill. In 1860, at the time of his death, these three concerns employed 250 hands, and in 1863 the units were incorporated as the Plunkett Woolen Company.

Just when the Parish Mills, in Hinsdale, were built seems to be lost in oblivion, but it is certain from their appearance today that they have existed for the better part of a century. Five or more years ago the location and equipment appealing to a group of progressive manufacturers they were purchased and set in operation after the lapse of years, and today the cheviot and cassimere suitings, topcoatings and overcoatings produced there, in which virgin wool exclusively is used are advertised nationally in magazines.

Here are made the old-time woolens—sturdy fabrics our forefathers wore to withstand the vigorous service of their era, but a new spirit pervades these cloths—the spirit of modern design and color, with patterns drawn by a fabric designer whose forbears created the colorful plaids in

the highlands of Scotland, yet these products reflect the vogue of modern American men and women.

The concern was incorporated in 1924, with a capital of $125,000. The plant is equipped with eight sets of cards, forty-six looms, complete dyeing and finishing departments, and employs 120 hands.

For many years Lanesboro was the seat of the Lanesboro Iron Company and of marble quarrying, brick making, lime kiln, saw and grist mill units.

The marble from local quarries was long the source of much local wealth. Quantities of the material were used in the old and new state capitols at Albany, N. Y.

LEE TURNS FROM HAND-MADE TO MACHINE-MADE PAPER

Nature seems to have ordained Lee to become a manufacturing town and as early as 1806 Samuel Church built, at South Lee, the first paper mill erected in that section of Berkshire County, the product being made by hand. Shortly afterwards, a second mill was built by Luman Church, which was operated by Harrison Garfield, and became known as Forest Mill. Five years later the town had two woolen factories—one at Laurel Lake, owned by Ball, Bassett & Company, and the other in the village of South Lee. About that time Messrs. Foote & Hinman began the manufacture of cotton duck and in 1817 the manufacture of gun powder was commenced by Laflin, Loomis & Company, near the center, and later at South Lee. At the same period Lee had four wood-turning plants, a pottery, an iron furnace and a bonnet factory. In 1820 the manufacture of carriages and sleighs was undertaken and in 1828 Messrs. Beach & Royce began the production of carding machines. Four years later the "stone mill" was built and cotton cloth was produced, followed by the manufacture of grain bags and later of pulp. Samuel Church erected a second paper mill where the Eagle Mill, of the Smith Paper Company, now stands, and in 1826, Messrs. Winthrop, Walter and Cutler Laflin erected a paper plant, known as the Housatonic Mill, which at that time was considered a marvel of enterprise. It was here that Byron Weston, of Dalton, received his paper-making education.

About that period, another plant was built by the Messrs. Claflin, farther up on the Housatonic River, and this unit is now the Columbia Mill, of the Smith Paper Co., and turns out an enormous quantity of tissue paper for condensers used in radio sets, fashioned from linen cuttings from the peasant clothes of England, France, Belgium, Russia and Italy, and from flax. The Smith Paper Co. produces about 60 per cent of all the linen tissue used by the radio industry of America.

The manufacture of paper in the United States may be said to date its existence, as a prominent pursuit, from the dawn of the Revolution. In the Colonial period there existed an ordinance, prohibiting the manufacture of any paper in this country, except the coarser kinds such as press boards. From the Revolution to 1830, the various mills that were built, due to the increased demand for paper, employed the slow and tedious process known as the hand method, though some years previous to 1830, Thomas Gilpin is said to have made leather and paper of a good quality by machine, and he is regarded as the pioneer in bringing the manufacture of machine paper into successful practice in this country.

About 1830 Howe & Goddard began at Worcester the construction of excellent paper-making machines and in the decade following the vast improvements made in the manufacture of paper by the application of

machinery and the introduction of chlorine in the form of gas—of chloride of lime and the alkalies, and of lime and soda ash in bleaching, cleansing and discharging the color from rags—rendered materials that previously had been used only for the coarsest kinds of paper serviceable for ordinary printing paper.

These improved processes brought about a very great reduction in the cost, a universal increase in demand and, as a result mills sprang up on New England water courses almost over night.

Owen & Hurlbut began the manufacture of writing paper at South Lee, in 1822, and that partnership continued until long after the middle of the last century. They commenced operations with one engine, and one vat, employing four men and six women and produced about four reams of foolscap and letter paper per day. No finishing apparatus having been introduced at that time, the sheets were merely pressed into a flat shape and left with a rough surface. The sides of the reams were untrimmed, and the quires were unstamped. Metallic pens had not been invented, consequently the roughness of the paper did not interfere with the use of the quill. It was customary to partially smooth the surface of the best qualities of paper by pressing the sheets between heated iron plates, a process which gave rise to what was known to the trade as hot pressed paper. This mode of finishing was prevalent until steel pens drove the hand-made paper almost entirely out of the market. Owen & Hurlbut introduced new devices and purchased many patented contrivances and as early as 1850 operated thirteen paper engines day and night, employed 160 hands and turned out at that period 400 reams of finished letter paper per day.

The present-day plant stands on the site of the second earliest paper mill built in Berkshire County, by Samuel Church. For thirty-eight years Owen & Hurlbut occupied the building, and for approximately the same period of time it was used by the old Hurlbut Paper Co., before it passed to the American Writing Paper Co., in 1899.

The existing three-story brick building was built in 1872 and is 373 feet in length, by fifty feet in width. About forty acres of land, water rights, easements and privileges are included in the holdings. At one time from 150 to 200 persons were employed in the establishment and some 10,000 pounds of paper a day were manufactured. In later years the concern specialized in paper for photographic use.

In 1880, following an extended rainy season, the dam at Goose, or Mud Pond, broke, releasing a torrent of water which destroyed a vast amount of property and swept away many of the mills, some of which were not rebuilt. The curious came from as far as Springfield, in carriages, to view the effects of the flood, and the story persists to this day in Lee that a frame building that had toppled over in an apparently well balanced position, blocked the main highway in the town, was righted and cleared from the road following the advent into the town of the famous Boston pugilist, John L. Sullivan, who, stepping from a carriage, and wearing a silk hat, walked to a corner of the structure, put his shoulder to it, and literally shoved it from the highway.

Although the first paper mill set up in Lee was established in 1801, and despite the fact that by 1857 there were twenty-five paper mills in operation in the town—the largest number then centered in any municipality in the United States—the value of the annual production of these units, estimated at $2,000,000, came from the exclusive use of rags as the principal raw material. In 1885 there were ten local firms operating

eighteen paper mills and producing daily 89,000 pounds of paper, and affording employment to 750 people.

THE BEGINNINGS OF THE SMITH PAPER COMPANY

Elizur Smith, born in Sandisfield, in 1817, came to Lee in 1830, where he secured employment in John Nye's general store, working for $20 a year and his board. Four years later, he purchased a half interest in the Turkey paper mill, in Tyringham, then operated by Messrs. Ingersoll & Platner, and in 1835 he bought Ingersoll's interest and formed the partnership of Platner & Smith, which continued for more than twenty-five years thereafter. In 1855, when Mr. Platner died, the junior partner continued operations under the old firm name. The Civil War brought great prosperity to Lee, and to the Platner & Smith concern.

Shortly after the war, Albert Pagenstecher, then operating a little paper mill, in Curtisville, in the town of Stockbridge, began experimenting in the manufacture of paper from wood pulp, the guiding genius of the method being Frederick Wurtzbach, of Lee, father of Carl Wurtzbach. Berkshire poplar was used on account of its whiteness, and about 2,000 pounds a day were produced, and the first practical demonstration of the new process of manufacturing paper from wood in America, took place in the Columbia Mill, of the Smith Paper Co., on March 8, 1867. It proved a success and the latter company contracted for the entire output of the Pagenstecher mill. When the native supply of poplar became exhausted, local spruce was used and proved even superior.

THE COLUMBIA MILL TURNS OUT THE FIRST PAPER EVER MADE IN THIS COUNTRY FROM WOOD PULP

In 1860, Robert McAlpin, a native of Scotland, who was then general manager of the Smith mills, began experiments in manufacturing paper out of wood pulp, which he continued until he was able to produce newsprint paper which could be sold in the New York market, on a commercial basis, and at a price of one-half the former cost of rag paper. Thus the beginning of a process which resulted in low cost of both the daily and weekly newspaper, as well as of the best literature in the world, was the product of Massachusetts inventors and was accomplished in a Bay State paper mill.

It was also from the Columbia Mill that Horace Greeley, about to start the *New York Tribune,* obtained credit for the paper he needed to embark on his editorial career.

One of the owners of the Columbia Mill at that time was Winthrop Laflin, a personal friend of Greeley's. The latter expressed to him a desire to found the *New York Tribune,* provided he could secure paper on three months' credit. Laflin being agreeable to the arrangement, a supply was sent Greeley and the *Tribune* was started.

This mill was later operated by Phelps and Field, the latter being a brother of Cyrus W., Dudley, Henry M., and Stephen D. Field. Cyrus W. Field, of Atlantic cable fame, was employed in this mill when a boy, and later, when he became interested in the paper business in New York, he exclusively handled Berkshire County products.

On February 3, 1865, within two years after Elizur Smith had bought and enlarged and increased the capacity of the Columbia Mill, it was burned, the disaster occurring on the day of his wedding, news of the fire being brought to him while the festivities were in progress. He quietly bade that they continue, and the following morning he was seen

at the ruins, giving orders to clear away the debris and making arrangements to rebuild at once. It was in this famous Columbia Mill that the paper was made upon which the articles of surrender of Gen. Robert E. Lee to Gen. Ulysses S. Grant were written at Appomattox.

Another of the Smith mills—the Housatonic—produced the newsprint for the first edition of the *New York Herald* and the concern continued to furnish paper for this publication for many years thereafter. It was in this same mill that the first hundred-inch Fourdrinier paper machine in this country was installed. Until 1896 the output consisted of book, newsprint and manila wrapping papers. At that time the production of these heavy grades was discontinued and the manufacture of fine tissues begun.

In 1866, the old firm of Platner & Smith became the Smith Paper Company, and in this enterprise, Wellington and De Witt Smith, nephews of Elizur Smith, became associated with him, and eventually succeeded to the management of the concern.

By 1890, the vicinity supply of wood became scarce, and as the use of sulphite pulp was still in its infancy, and prohibitive in price, the manufacture of heavy grades gave way to the production of fine linen tissue of all types, and in recent years, with the development of the radio, the volume of tissue papers for the condensers of radio sets has assumed tremendous proportions in the Smith plant, the Pittsfield plant of the General Electric Co. alone using more than 500,000 pounds annually of Lee tissue in the production of condensers.

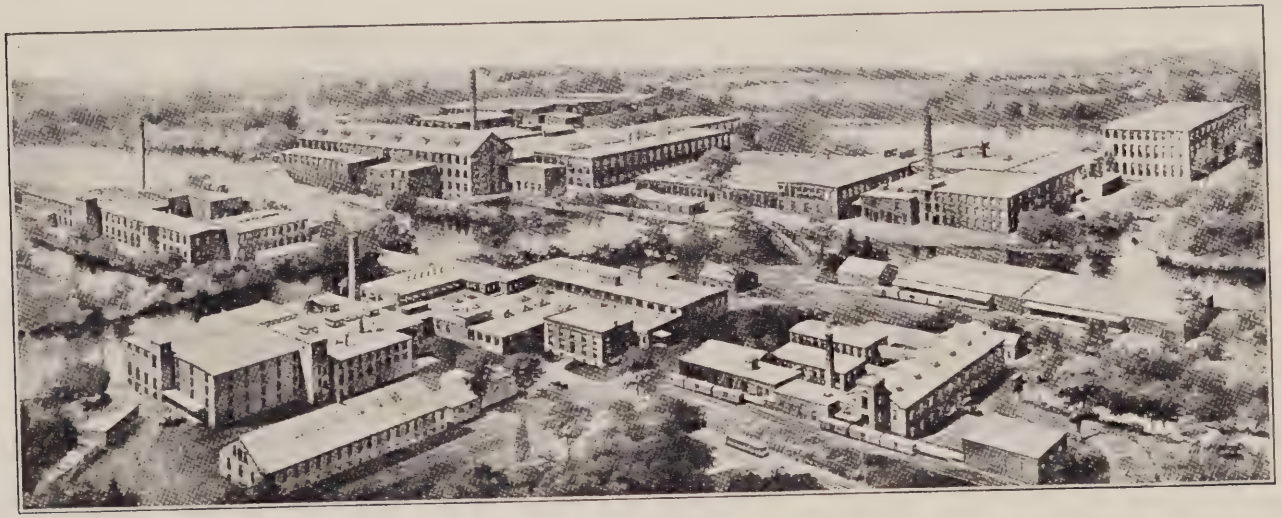
If the reader should take apart an old condenser used in his radio set, he would find it contained two long strips of rolled aluminum foil, alternating with tissue, the latter free from impurities and strong, despite the fact that it is only four-tenths of one thousandth of an inch in thickness It is, nevertheless, an excellent insulator, and in the condenser it acts on the same principle as Benjamin Franklin's Leyden jar, of 1752, when he experimented with a kite during a thunder storm, and allowed the wet strings to conduct electricity from the clouds to the jar where he stored it. With extreme rapidity, electricity flows in and out of this radio condenser, acting as a balance to the tuning coil in the set, and without this important little device it would be difficult if not impossible to operate the modern radio. The reasons why Lee is so well adapted to the manufacture of fine linen tissue are the dryness of the air, freedom from dust, the high altitude and the purity of the water flowing from the mountain streams.

In 1917 the company was reorganized under its present name, The Smith Paper Company, and immediately started remodeling plants and equipment, installing up-to-date machinery and modern operating and cost finding methods.

At present the company operates seven machines producing high grade tissues—the output including—condenser, carbon, cigarette, silver, copying, stereotype and India Bible papers. Activities cover a floor space of approximately ten acres and some five hundred workers are employed in the four units—the Eagle, Columbia, Niagara, and Valley Mills.

In Lee, as in almost every other manufacturing town in the Bay State, one finds concrete and indisputable evidence of growth and increased prosperity, in the substantial additions that are constantly being made to existing industrial concerns.

In 1929 contracts were awarded by The Smith Paper Co., for extensions to The Columbia and Niagara Mills of that concern, the addition to the former plant being of brick and concrete and affording room for the installation of a third paper-making machine, while the enlargement at



SMITH PAPER COMPANY, LEE

the Niagara unit met requirements imposed by the remodeling of a paper-making machine engaged in the production of paper for electrical concerns.

For some years prior to 1929 The Smith Paper Co. operated only three of its five local units, but on May 1 of the latter year the Niagara Mill was reopened after a shut down of six years, and the Centennial plant is now the only idle factory.

It is undoubtedly true that one of the large mills of The Smith Paper Co. today employs more operatives than a dozen mills of earlier years, but nevertheless, pioneer paper making called for energy and ambition, and capital was limited. Without the laboratory assistance of this era, the paper industry demanded men of iron, and gave greater play for Yankee ingenuity than has been required since the development of modern paper-making machinery. In the early days each little mill gathered its rags from the immediate vicinity, and depended largely on that region as the market for its production.

The present officers of this $2,300,000 concern are president, N. H. Busey, Jr.; vice president, G. L. Clark; treasurer, C. J. Donahoe, and secretary, Wellington Smith, the latter linking the present company with the one that preceded it.

Until the great development of paper plants at Holyoke, the town of Lee took rank as being the greatest paper producing town in the United States. The original mill owned by Messrs. Platner & Smith was for many years the largest individual plant used in the production of paper in this country.

THE FIRST BLOTTING PAPER MILL IN THE BAY STATE

The Eaton-Dikeman Company was organized in 1891, to manufacture blotting and absorbent papers, and was the first and only blotting paper mill established in Massachusetts.

For many years it specialized on blotting and matrix papers, but as progress in the electrical field grew there arose a demand for saturation papers for making bakelite and hard fibre and this company was one of the first to enter this then new field.

Other uses for absorbent papers were created by the demand for a higher quality of oils, paints and varnishes, which resulted in a market being developed for filtration papers. This concern was the leader in making this new type of paper and it is today the largest manufacturer of industrial filter papers in America, as well as the leader in the finer qualities of filter paper used in laboratories and by druggists. Its brands are known all over the United States, Canada and South American Republics, and its industrial filters are shipped to all parts of the world. It maintains a sales office and warehouse in New York City and employs 100 operatives, at Lee.

The officers of this $90,000 corporation are, president, C. C. Yates; treasurer, W. H. Eaton, and secretary, E. A. Sitzer.

MANY FAMOUS AMERICANS HAVE LIVED IN LEE, OR VICINITY

Famous as the papers manufactured in Lee have been and are today, the locality has become celebrated as the residence or vacation ground of many of America's greatest characters.

On the occasion of one of Henry Ward Beecher's visits to Lenox, he reported to his hostess, when returning from a drive, that he had stopped at a mill where, at the moment, they were manufacturing the paper to be used in the publication of his famous Star papers. Back in the early

'50s many interesting people lived in Lee, or the nearby towns, and perhaps one of the best descriptions of these notables was written by Nathaniel Hawthorne, who resided in Lenox, for a few years, and who said in his "Wonder Book:" "Mr. Dewey lives at the foot of Taconic. In Stockbridge yonder is Mr. James, conspicuous to all the world on his mountain pile of history and romance. Longfellow, not yet at the Oxbow, but here in Lenox; Miss Sedgwick, our most truthful novelist, who has made the scenery and life of Berkshire all her own. On the hither side of Pittsfield, sits Herman Melville, shaping out the gigantic conception of his white whale, while the gigantic shape of Greylock looms upon him from his study window. Another bound to the door of Holmes."

He might well have added glimpses of James T. Fields, Henry Ward Beecher, Charlotte Cushman, and Fannie Kemble, with the latter's guests, her actor father and uncle, and the great tragedian, Cready, all of whom were habitues of Berkshire, in that era. In later years, Richard Watson Gilder, the poet and editor of the *Century*, resided in nearby Tyringham, and for several summers his friend, President Grover Cleveland, occupied a neighboring farm, going to Lee frequently for his mail.

THE LEE LIME CORPORATION

Lime has been burned in Lee for upwards of one hundred years. In the beginning, the old type of burn out kilns, then standard throughout the country, were built, but they were found to be inefficient, low producing units which made a quality of lime that was entirely unsatisfactory.

The Lee Lime Corporation was founded by Martin Deely, grandfather of the present head of the concern, John F. Deely, about 1890.

About 1905, Martin H. Deely, son of the founder, became associated with the concern and a more modern plant was built, which was added to and improved until today it is one of the most up-to-date units in the United States. Materials are handled wherever possible by machinery and modern burning methods and hydrating plants have been installed.

In 1905, the company took over a plant at Canaan, Conn., which has been developed to a unit of six kilns of modern type and construction.

The business was originally built up as a chemical lime concern to supply lime principally to the sulphite mills in Maine, northern New York and New Hampshire. From this developed an increase in the use of lime for building purposes, and the latter market is now a very large part of the corporation's business.

In 1926, the business was organized as a corporation and a third plant, at West Stockbridge, was absorbed, where principally rotary kiln operations are carried on for finishing purposes in the building field.

The most recent addition has been the development of a finishing hydrate at the Lee plant, previously manufactured only in the state of Ohio. This new hydrate is considered better than the Ohio hydrates and is now being marketed in the New England, New York and New Jersey territories. The concern employs upwards of 100 operatives.

The present officers of the company are John F. Deely, president; J. M. Deely, vice president; Margaret E. Deely, treasurer, and the stock of the corporation still is, as it has been for three generations, in the one family.

For many years Lee marble has been famous in the construction world and formerly quarrying was a prominent element in the industrial life of the community. The local white marble withstands a pressure of 26,000

pounds per square inch, and nearly 1,000,000 headstones for the soldiers of the nation have been made from the local product.

From a quarry in Lee was secured the marble used in erecting the wings of the Capitol, at Washington, D. C., and upwards of 700,000 cubic feet were used in erecting the Philadelphia city hall.

The Lee Marble Works, Inc., established in 1852, and incorporated in 1922, are capitalized for $150,000 and employ fifty operatives in quarrying and finishing block and sawed marble. James O'Brien is president and treasurer and Frank I. Diamond secretary of the corporation.

Inasmuch as Lee has been so prominent from the beginning of Massachusetts industry in the field of paper production it was but natural that there should be established in the town a concern to manufacture paper mill machinery. The Clark-Aiken Co., with a capital of $125,000, employs fifty operatives in producing up-to-date equipment of this type. H. A. Clark is president and treasurer and Walter S. Aiken secretary of the corporation.

The Mountain Mill Paper Co., with capital of $197,210, employs thirty-five operatives, in the manufacture of grease proof and glassine paper; Louis T. Stevenson being president of the concern; the Thistle Wire Works, owned by George W. Roberts, are engaged in manufacturing wire cloth for paper mills; and D. D. Hopkins, with capital of $125,000, employs forty operatives, at South Lee, in the manufacture of box shooks and lumber.

Few towns of 4,000 population in the state have more progressive units than Lee.

The fifteen local manufacturing concerns operating in Lee, in 1927, had a capital investment of $6,897,295, used stock and materials valued at $1,387,729, paid 554 workers $770,491 in wages, and placed on the market commodities valued at $2,955,087.

THE INDUSTRIES OF LENOX, MONTEREY, NEW MARLBORO, NEW ASHFORD, AND OTIS

As early as 1765 charcoal hot-blast furnaces were built by the Lenox Iron Works Company and over 2,000 tons of metal were made from the ore extracted there.

Lenox marble has been famous since 1800, when the first local quarry was opened and Nathan Barrett erected a mill for sawing marble. The Lenox Iron Company was incorporated in 1848, with $100,000 capital, and at the village in the southerly part of the town, known as Lenox Furnace, the remains of the plant may be seen today. Later the Lenox Glass Works came into being, but with the development of the town as the habitat of wealthy New Yorkers, the growth of industry has not been encouraged and today Lenox boasts only of the Berkshire Gravel Company, employing twenty-five men in handling sand and gravel for industrial purposes.

In some respects this concern constitutes an industry unique in Massachusetts, for it is engaged in tearing down a mountain created by nature to make materials for buildings fashioned by the hand of man. For years it has been gouging out the unlovely height of Willow Mountain, and utilizing 25 per cent of the material in the manufacture of Shope brick, turning the remaining 75 per cent into a myriad of building operations, from concrete roads to city business blocks.

The owners, Messrs. James W. Washburn and A. I. Newton have installed the most modern machinery which works so effectively that from

the time the gravel is torn from its foundation until it is dumped on roads as far as 25 miles away, it is not touched or worked by human hands.

It was in Lenox that Charles Lanier Lawrence passed his youth and the years of his early manhood, with his grandfather, the late Charles Lanier, and in the latter's villa, the grandson carried on his first mechanical experiments and designed the first crude engine that in later years as a perfected entity furnished the motive power that carried the "Spirit of St. Louis" across the seas, with Col. Charles A. Lindbergh as its internationally famous pilot.

Monterey once possessed paper and cotton mills, a rake shop, a horn comb shop and two extensive rat trap factories, while Mt. Washington had saw and grist mills, axe and shovel factories and an iron forge, but all these departed with the advent of the railroads.

New Marlboro saw the rise and fall of grist and saw mills, an iron forge, a fulling mill, a hat factory, a powder plant, several tanneries, and machine shops, a pottery establishment, and a paper mill which operated under the name of the Berkshire Paper Company, but like those of many of her neighbors her units moved to localities where better transportation facilities existed. Today, the only manufacturing unit in the town is the plant of Turner & Cook, Inc., in the village of Southfield, capitalized for $100,000, and employing 75 in the manufacture of rawhide products. H. A. Cook is president and treasurer, and P. J. Cook, secretary.

New Ashford operated for many years extensive quarries where blue and white marble was extracted, but here again high transportation costs prevented successful competition with quarries nearer the rail lines.

At one period Otis had grist and saw mills, carding and fulling plants, chair factories, wooden ware plants where bowls and dishes were produced, a forge and even a distillery, but today its industrial life is centered in the activities of the Chester Granite & Polishing Works of Chester, whose quarries are located in Otis.

In 1824, Miles Welles built an iron forge and in 1848, puddling works were erected in the village of Cold Spring.

THE WORLD-FAMOUS RICHMOND IRON WORKS

The Richmond Iron Works were established at Richmond in 1829 and were incorporated in 1842, and for more than half a century the concern operated plants in that town, the village of Van Deusenville, Cheshire, Lanesboro, Lenox, Stockbridge, Chester and West Stockbridge, turning out 12,000 tons of iron annually.

When the iron works ceased production about ten years ago the industry, which at one period constituted the manufacturing life of these towns really came to an end in Berkshire County. Only the unit at West Stockbridge was then using anthracite coal, all the others employing charcoal for fuel to melt the ore and stone, which entered into the composition of the iron produced.

In its early days the Richmond Iron Co., employed from 70 to 100 hands, and with all its units in operation some 700 found work. During the Civil War practically all the output was used by the Federal Government in fabricating cannon and the iron ore industry easily ranked first in the county during that period. Following the war, the company changed hands and for years after a grade of iron was produced for the manufacture of car wheels, but with the development of the steel industry the market became circumscribed.

In the prosperous days of Richmond Furnace a railroad station was

built where considerable freight and passenger traffic was handled and several stores, a post office and a number of company houses, both at the furnace and near the mine, were erected. Many of these houses have disappeared, having fallen to decay or been torn down and all that is left are the cellars now overgrown with weeds. The property which was once held under the name of the Richmond Iron Works has been divided into small parcels and is now owned by many individuals who bought after the decline set in.

The furnace property was dismantled piecemeal. The chimney brick went into a garage in a nearby town and the slag dump is proving a wise investment for a local citizen who has disposed of a great number of yards of it to a road contractor to be used as construction material.

The stores that once catered to the public wants are closed and the mail is delivered by a rural carrier. Few of the families remain and little is left in the village to remind one of its former thriving days except the open pit where the ore was mined and which is now slowly filling with water and the partially demolished furnace, where the fires once burned day and night month after month.

INDUSTRIAL VENTURES IN SANDISFIELD AND STOCKBRIDGE

The residents of Sandisfield early took advantage of the power facilities of the Farmington River and set up grist and saw mills, a forge, a scythe factory, a silk mill, a wagon plant, chair, plane handle, and school furniture factories and a tannery, but all these long since sought more favorable locations, or passed out of existence. Papier mache was manufactured there at one period during the last century.

Stockbridge at one period of its life was a busy industrial community, being the seat of small grist, saw, cotton, woolen, and paper mills, hat, nail and chair factories, a smelting furnace, a tannery, a foundry, a machine shop; and a woolen factory was established about 1789 which produced between 5,000 and 6,000 yards of fulled cloth yearly.

For many years hematite iron ore was mined in Stockbridge for the use of the Hudson Iron Works, of Hudson, N. Y., this ore lying in a range with the Salisbury iron, which was celebrated in the earlier days.

On October 22, 1813, Ebenezer Harrick, of Stockbridge, was granted a patent on a stocking loom—the first ever recorded on such a device.

It was in the town of Stockbridge, that Albert Pagenstecher produced wood pulp, in 1865, and furnished it to the paper mills of Lee for some years thereafter.

THE FIRST FOURDRINIER MACHINE SET UP IN AMERICA MADE PAPER IN TYRINGHAM

In 1832 the famous Turkey Mill, named after the ancient and original Turkey Mill, in Maidstone, England, was erected on the site of the present Stedman Rake factory, on Hop Brook, Tyringham, by Riley Sweet and Asa Judd, who carried on business under the firm name of Sweet & Judd. Started as a hand mill making one sheet of paper at a time on a wire mould, it soon boasted two engines, a cylinder machine, and a production of 400 pounds of paper per day. In 1833 Jared Ingersoll and George Platner bought the mill, and two years later, Elizur Smith, founder of the present Smith Paper Co., at Lee, bought an interest in the concern, and the firm of Ingersoll, Platner & Smith was formed. The senior member soon withdrew and the remaining partners operated the plant until 1855.

In 1849 they introduced the first Fourdrinier machine used in this

country and began making watermarked, first-class paper. Soon they attained the reputation of making the best writing paper in the United States. By 1855 the mill had been enlarged and fitted with seven engines. Mr. Smith decided to engage in paper making where railroad facilities were afforded, and removed to Lee. In 1869 the Tyringham mill was rented to Watkins and Cassidy. Shortly afterwards the mill burned, and in 1872 George W. Cannon erected a three-engine plant on the same spot. He was succeeded in ownership by Robert Slee, of Poughkeepsie, but the new mill was never a success. The building is now in use as a rake factory by Marshall W. Stedman, this industry even antedating the paper industry in Tyringham, the present business being run by the fourth generation of the same family.

At one time the Turkey Mill boasted the loudest steam whistle in the world, according to old residents. Its tone was so clear and loud that it could be heard as far as Otis, Lee and Stockbridge. It was claimed that every time the whistle was blown the boilers consumed one cord of wood to produce the necessary steam.

During the later years of the operation of Turkey Mill the manufacture of fine papers was discontinued, and newsprint, produced from de-inked papers, a new invention at the time, was turned out, the owners paying a royalty to the patentees of the de-inking process.

All that remains of the old Bay State Paper Mill is the tall brick chimney which stands sentinel-like west of Main Street, a short distance from Tyringham's library building, marking the site where, in 1846, Ezra Heath and Joshua Boss erected their paper plant. They sold the mill to S. C. Johnson & Co., two years later, and in 1850 it was burned. The following year George W., and John T. West rebuilt the plant, operated it a year and disposed of it to J. W. Sweet and John M. Northrop, who sold it the following year to George W. West who successfully managed it for thirteen years thereafter. It is related that in 1866, a young man made his advent into Tyringham, asked West to sell him the mill, and fixing a price of $5,000 on the property, the deal was quickly completed, and the stranger took over the plant and operated it until 1871, when it was burned and never rebuilt.

THE STEDMAN RAKE FACTORY

In Tyringham, is located the oldest rake business in the United States, founded by Thomas Stedman, who was born at Kingston, R. I. in 1767, and whose father had served as an ensign in the Revolutionary war. After following the sea for thirty years, Capt. Thomas Stedman set out on horseback, through the forest trails of Connecticut, and finally reached Hop Brook, in Tyringham. Here he decided to settle, and here he erected a sawmill on a water privilege which is still used.

In 1827, his oldest son, William, invented the first machine ever used in the manufacture of rakes. The latter was succeeded in 1870, by his son, Martin, and, in 1887, Marshall W. Stedman, representing the fourth generation from father to son of Tyringham rakemakers, acquired the business, and removed it from "Sodom" to its present location.

When Thomas Stedman began the production of rakes he effected his deliveries by horse and wagon. His son resorted to railroad transportation and his great grandson, Marshall W. employs motor trucks.

While the demand for the old time hay rake has decreased fifty per cent, the market for the lawn rake has more than made up for this loss.

For a number of years past, the Stedman Rake Factory has annually turned out upwards of 30,000 rakes.

Marshall W. Stedman buys hickory by the pound, a cord weighing three tons. After forty-three years in the business, which has been conducted by his family for one hundred three years, Mr. Stedman is extremely optimistic regarding the continuity of the local and vicinity supply of his raw material. "I know of groves that have been cut off three times in the past hundred years," he said, "and there never was so much standing timber in Tyringham since the town was founded in 1760, as today. Many farms that were large dairy producers two generations ago are now growing up to forests."

It has been the custom of Marshall W. Stedman to provide the Presidents of the United States with his rakes, and Theodore Roosevelt, William H. Taft, Warren G. Harding, Calvin Coolidge, and Herbert Hoover have been recipients of the products, the handles and heads being of ash, and the teeth and bows of hickory.

A citizen of the town of Monterey is using a rake that he bought of the grandfather of the present owner of the business eighty years ago, the teeth of which are now worn down to two inches in length.

In the eighties, three local factories manufactured 48,000 hand-rakes.

THE INDUSTRIES OF WEST STOCKBRIDGE, WILLIAMSTOWN AND EAST WINDSOR

West Stockbridge had nine quarries in 1830 engaged in marketing slate and marble, and five marble mills, and a lime kiln. The town was also the seat of the Stockbridge Iron Company. In 1856, the principal marble quarries of Berkshire County were those owned by J. K. and M. Findley, of that town. Today, the Grangers Mfg. Company operating with a capital of $300,000, and employing 50 in producing agricultural limestone and limestone products, with a Boston office at 53 State Street, and Clifford L. Miller employing from 75 to 100 in purveying lime and lime products to the trade, are the only local industries. A. J. Lovett is president, M. C. Lynch, treasurer, C. P. Tomlinson, vice president and general manager, and Daniel F. Collins, secretary, of the Grangers Mfg. Co.

In 1875, the Glendale Mills, manufacturers of woolens, was capitalized for $250,000 and employed 140 hands.

As early as 1826 Williamstown had a cotton factory located on Green River, employing 40 hands, but the plant was destroyed by fire in 1883. A starch factory was started in 1833, which subsequently failed, the raw materials being potatoes raised on nearby farms. In 1828 the Blackinton Woolen Factory was built and when it was burned in 1842 another was erected.

In 1831, the Blackinton Mills were founded by Sanford Blackinton and were incorporated in 1876. The present-day Blackinton Company, was incorporated in 1918, and manufactures men's wear worsteds and woolens, the plant being equipped with 94 looms and complete dyeing and finishing departments. It employs 350 hands. It has capital of $536,500. John H. Waterhouse is president, and Albert J. Buffum is treasurer. The products are marketed by the Waterhouse Worsted Co., 334 Fourth Ave., New York City.

In 1865 the Williamstown Mfg. Company was formed and engaged in the production of prints, employing 200 hands in 1885 when production reached 18,000 yards per day. The Williamstown Watch Company began

the manufacture of watches, in 1883, with $300,000 capital, but meeting with misfortunes the factory was changed into a twine mill.

Today, Williamstown's biggest industry is the Greylock Mills, Inc., a unit of W. C. Plunkett & Sons Co., of Adams, where combed cotton cloths and warp yarns are produced, 125 hands being employed. The mill is equipped with 39 cards, 20,672 ring and 3,312 twist spindles. The Boyd Textile Corporation, with capital of $600,000, employs 175 hands in the manufacture of corduroys, fustians and velvets. This concern was originally established in 1909 by John S. Boyd as the John S. Boyd Co. The present officers are John S. Boyd, president, and A. L. Stirn, treasurer.

The estate of Charles H. Ball still carries on the production of skewers and lolly-pop sticks, at East Windsor.

The entire 214 industries of Berkshire County had a total capitalization of $91,420,395, in 1927, used stock and materials valued at $47,623,-465, employed 20,251 men and women to whom were paid $24,992,678 in wages, and manufactured commodities valued at $105,760,679—a very impressive record and one that stamps the county as the habitat of industries whose reputation for quality commodities is world-wide.

In 1831, ninety-nine years ago, ALL of the industries then existent in Berkshire County had aggregate capital of but $2,087,930 and the value of the products turned out was $2,006,965.

The figures hardly justify statements that industry is declining in Western Massachusetts.

CHAPTER XI

FALL RIVER—THE TEXTILE CITY OF THE GLOBE

Undoubtedly the remarkable stream known as Fall River exercised a very potent influence in the early days of the industrial development of the municipality which bears that name. Possessing a descent of 130 feet in less than half a mile, and for the greater part of its length confined between high granite banks, its power potentialities were speedily recognized and one of its chief characteristics—the almost uniform and constant supply of water which assured its users that little or no injury or inconvenience would follow its being harnessed—doubtless led the pioneers of Fall River to seize its power by placing the wheels, upon which the stream was brought to act, directly in the very bed of the river.

Nearly all the water power adjacent to and the realty on which Fall River's principal industrial plants are located were owned by the Borden family, from early in the eighteenth century. The site on which the Fall River Manufactory was erected, in 1813, was originally the location of a mill, inherited by Thomas Borden, from his father, Richard Borden, and the same course of descent applied to the realty and water power of the Fall River Iron Works, established in 1821, the Annawan Manufactory, formed in 1825, the American Print Works, established in 1833, and the Metacomet Mill, set up in 1846, and in all these enterprises Richard and Jefferson Borden, sons of Thomas Borden, a farmer and



RICHARD BORDEN



JEFFERSON BORDEN

of Fall River

Known for many years as the "Fathers of Fall River." Succeeded to the ownership and management of the Fall River Manufactory

miller, were copartners in the original ventures and assisted in supervising their establishment.

In 1803, the population of the town of Troy, which was the municipal predecessor of Fall River, and which embraced the same territory that the latter place possessed after its incorporation, was made up of eighteen families, nine of whom bore the name of Borden. From that day to this the Bordens have been prominent in the industrial, commercial, politi-

cal and social life of the community. They early set up saw and grist mills along the river, and to Col. Richard and Jefferson Borden, belong a large share of the credit for the remarkable progress of the industries of the community.

They were the founders of the Fall River Iron Works, which became the source of much of the capital for the development of many of the important manufacturing enterprises of later years, including the present American Printing Co., the Metacomet Mill, the Fall River Gas Co., the Troy Cotton & Woolen Manufactory, the Fall River Manufactory, the American Linen Co., the Richard Borden Mfg. Co., the Annawan Mills, and others.

They are often referred to as the "Fathers of Fall River." Natives of the town, they saw it grow during their respective life-times, and largely by their enterprise, from a mere hamlet to a great manufacturing city.

In less than a hundred years the cotton textile industry transformed a high, rocky knoll on the shores of Mount Hope Bay, which once was the scene of many an Indian foray between the Pequots and King Philip's braves, from a town of 2,535 in 1800 to a city of 119,205 in 1920, and which for many decades has ranked as the greatest coarse-cotton manufacturing center of America.

A single day's normal production of cotton cloth, made in the mills of Fall River, would extend 2,000 miles in length, or from Bristol County, in Massachusetts, to Salt Lake City, in Utah.

Located at the mouth of Taunton River, on the eastern shore of Mount Hope Bay, an arm of Narrangansett Bay, Fall River is the center of a circle of a twenty mile radius, which includes the cities of Providence, Taunton, New Bedford and Newport. It has one of the finest harbors on the Atlantic seaboard, eighteen miles inland from the ocean, and possesses a natural 25-foot channel and anchorage, with several miles of water frontage and a score and a half of wharves serving the commerce of the city.

It is the eastern terminal and home port of the famous Fall River and New York Line. The steamers are known the world over for the richness of their appointments and the excellence of their service. This line is one of the oldest in continuous operation in the world, having been established in 1847. The express train service, operated by the N. Y., N. H., & H. R. R. Co., between Boston and Fall River, in connection with the Fall River line of steamers, enjoys the longest uninterrupted history of any similar enterprise in the country. The all-steel train now operated between the Fall River line wharf and Boston, without a stop, is the lineal successor of the express which first ran over the Old Colony road, in 1847.

Several auto truck freight lines join Fall River, with other cities of Eastern Massachusetts and Rhode Island.

THE FIRST LOCAL TEXTILE UNITS

The influence of Samuel Slater, who had been so successful in introducing into America the English methods of manufacturing cotton, led Col. Joseph Durfee to organize and construct in 1811, in what then was the village of Fall River, in the town of Troy, the Globe Mill, the first plant built there, the product of which was cotton yarn.

The original structure, a small one-story building located on the north-

east corner of Globe and South Main streets, was burned, and later the old building, which stood until a few years ago was erected.

In spite of Durfee's persistency in constantly trying new devices to improve the crude machinery which was continually breaking, he was unable to make a success of the undertaking, and, although the mill was run by the residents of the little village until 1829, it was never a financial success, and Durfee died a poor man in 1843.

From 1829 to 1839 the plant was operated as a printing mill, being known from 1835 to 1839 as the Riverton Print Works. After many vicissitudes the mill passed to The Globe Yarn Co., and later to the Laurel Lake Mills, and is held by that corporation because of the water power privileges.

If Colonel Durfee's venture was not a success, he at least pointed in the direction of Fall River's real prosperity and led the way, for, in 1813, other Fall River capitalists followed the path which he had blazed. In that year two corporations for the manufacturing of cotton and woolen cloth were formed,—the Troy Manufacturing Company, with $50,000 capital, changed the following year to the Troy Cotton and Woolen Manufactory, and the Fall River Manufactory. The Troy Cotton & Woolen Manufactory was promoted by Oliver Chace, Nathaniel Wheeler, and Eben Slade. The articles of association were drawn March 8, 1813, and included among the incorporators were members of the Borden, Durfee and Buffington families, which have been so prominent in the industrial life of the community. The company received its charter, in 1814, and at that time the capital stock was increased to $66,000. The original mill was 108 feet long by 37 feet wide, and four stories high, and was planned to accommodate 2,000 spindles.

From 1820 to 1824 the plant ran night and day, and in the latter year the first dividend, of $25 a share was declared, and three months later a second for the same amount was paid.

In 1820 power looms were installed, and the company added a dye-house where the yarns produced were colored.

The Troy Cotton & Woolen Manufactory operated under its ancient designation until 1929, when its stockholders voted to liquidate the corporation, which then had capital of $300,000. This concern, at that time 117 years old, employed 425 operatives and manufactured print cloths, book cloths, converters' goods, and gauze, netting, and tobacco cloth.

The plant which included two mills, was equipped with 50,944 ring spindles, 1,170 looms, 75 cards, four boilers, and a water wheel. John S. Brayton was president, J. Edward Newton, treasurer, Fred G. Bogle, clerk and Walter Britland, superintendent, at the time it ceased operations.

By 1820 the population of Troy had grown to 1,594 persons.

The Fall River Manufactory was established with $40,000 capital, and David Anthony, who headed the corporation and became its agent, installed 1,500 spindles upon the completion of the mill, in 1813. At that time, Anthony was 27 years of age, and from 1808 to 1812, had been an employee in Samuel Slater's factory. Associated with him in the Fall River enterprise were Dexter Wheeler and Abraham Bowen. The original factory was 40x80 feet, three stories high, and was intended for 1,500 spindles. At the outset, the concern, and the Troy unit, spun yarn, which was woven into cotton fabrics on hand-looms in the homes of the housewives of the vicinity. Weaving was introduced in 1817, when

plain cloth, 36 inches wide, which sold for 25 cents a yard, was manufactured.

The power-looms installed at that time were made by Dexter Wheeler, and were set up in the plant of the Fall River Manufactory. They were heavy and clumsy products, constantly out of order, and the control of the shuttles was practically nil. A great quantity of poor cloth was produced, and the dressing equipment was inadequate, the yarn mildewing and rotting on the beams, resulting in great waste. Each of the spinning frames was equipped with 72 spindles. One spinner could tend a pair of frames, and produce two and one-half skeins of yarn per spindle each day. The hours of operation were from 5 A. M., to 7:30 P. M., daily in the winter season, while in the summer months the plant was operated from sunrise to sunset. The wages were low, the weavers on the first three power-looms installed in the plant being paid $2.50 per week. The force employed soon after, when 30 looms had been installed, included 15 weavers, each operating two looms, three dresser tenders, ten spinners and three carders, a total of 31 workers. In 1821 fancy stripe fabrics were woven in the plant, and six years later the type of production had so improved as the result of better machinery that an addition was made to the mill. The Fall River Manufactory was subsequently absorbed by the Pocasset Mfg. Co.

The Union Cotton Factory was started in 1813 in a small building, on the site of the Laurel Lake Mills, in what was then the village of Tiverton, by Edward Estes and others, and was the fourth cotton plant established in Fall River. It was burned in 1838.

In 1814 Dexter Ballou began to spin cotton in Fall River, the plant later becoming known as the Lyman Mill.

THE FALL RIVER IRON WORKS CO.

In 1821, a new era dawned in the history of Fall River, largely through the instrumentalities of Col. Richard Borden, who formed the Fall River Iron Works Co., which became a powerful and influential element in the industrial and financial life of the community, and which frequently was referred to as the "Earliest Germ of the Wealth of the City." Associated with him in the enterprise were Holder Borden, David Anthony, and William Valentine, all of Fall River, and Joseph Butler of Providence, R. I. Iron hoops for binding oil casks for the New Bedford whaling interests were the initial products.

For more than 50 years, Richard Borden was its agent and treasurer, and through his influence it acquired an interest in the Troy Cotton and Woolen Manufactory; in the Fall River Manufactory; the Watuppa Reservoir Co., organized in 1826; the Annawan Mill, which was built by it, in 1825; the American Print Works, also erected by it and leased to an operating corporation; in the Metacomet Mill, built in 1846; in the Fall River Railroad, which was constructed the same year, and in the Bay State Steamboat Co., and the Fall River Gas Works, which came into being the following year.

Colonel Borden was president of the Troy unit, of the American Linen Co., the American Print Works, the Richard Borden Mfg. Co., the Mount Hope Mill Co., the Fall River National Bank, the Watuppa Reservoir Co., the Bay State Steamboat Co., the Providence Tool Co., the Cape Cod Railroad Co., the Borden Mining Co., of Frostburg, Md., and a director in the Annawan and Metacomet Mills, the Fall River Gas

Co., the Old Colony R. R. Co., and director and treasurer of the Fall River Iron Works Co.

Not until 1825 were the Fall River Iron Works incorporated, and the concern was subsequently acquired by Matthew C. D. Borden. Its original capitalization was $18,000, but twenty-five years after it came into being it had capital and surplus of $1,500,000, which had been accumulated wholly from the profits of the enterprise.

It may truly be said to have been the corporate Briareus of Fall River, and possessed of the brain of Mercury.

THE POCASSET MANUFACTURING CO.

The next local company to be incorporated was the Pocasset Manufacturing Company, organized in 1822, with a capital of $100,000, the principal stockholder being Samuel Rodman, of New Bedford, who became president, while Oliver Chace, of the Troy Mill, was retained as agent. It engaged in the manufacture of sheetings, print cloths, and shirtings.

The original plant, built of stone, was 100 by 40 feet and three stories high. It proved too large for the company's business, and in 1824 Andrew Robeson, of New Bedford, hired a part of the manufacturing space, and started the first plant for printing calico in Fall River, the concern taking the name of the Fall River Print Works Co., in 1826. That year, the Quequechan Mills were built by the Pocasset Mfg. Co., for the manufacture of print cloths.

In 1825, a satinet factory occupied a part of the site later operated as one of the units of the Pocasset concern.

For a little over a century the Pocasset Mills were among Fall River's prominent concerns, and at the height of their production employed upwards of 1,000 hands. When sold a few years ago it was realized that their location in the very heart of the city, and adjacent to the principal business thoroughfare, offered opportunities on account of the greatly enhanced price of land, for an advantageous figure to be secured, and the desire of a contractor to use the stone contained in their walls in building the abutments of the Mount Hope bridge, resulted in the sale of Mills 1, 2, 3, and 4, leaving only the No. 5 mill for manufacturing purposes. Then came the disastrous fire of February 2, 1928, which destroyed the units that had not been razed, with the exception of Mill No. 5, which was separated from the main group, and into which the best of the machinery had been moved, including about 45,000 spindles and 800 looms. This unit was formerly known as the old "White Mill" of the Fall River Manufactory Co.

The Annawan Manufactory was formed on February 8, 1825, with capital of $160,000 to manufacture print cloth. It was equipped with 10,064 spindles and 232 looms. John S. Brayton was president, and W. F. Shove, clerk and treasurer of the corporation, when, in 1905, the original factory was purchased by Matthew C. D. Borden, who tore it down, and erected a new plant on the site.

In 1827, the Massasoit Mill, first operated by Brown & Ives, was erected. They sold the property to Holder Borden, who, in 1843, built a new plant and ran it as the Massasoit Mill. Later the factory was operated by Linden Cook, as the Watuppa Mills, and still later the property was acquired by the Pocasset Mfg. Co.

The art of printing on calico was extended in Fall River in 1831, when the Tiverton Print Works were built. Later they became the Globe Print Works and still later the Bay State Print Works, the latter

company being organized in July, 1853, with a capital of $300,000. There were at that time ten printing machines in operation, and 500 employees on the payroll. For the year ending July 1, 1854, the plant produced 12,000,000 yards of calicoes, and 2,000,000 yards of delaines, valued at $1,430,000. Subsequently the printing of delaines was abandoned. Jefferson Borden was president of the Bay State Company and Thomas J. Borden was secretary and treasurer.

THE AMERICAN PRINTING COMPANY

Holder Borden, an industrialist of remarkable boldness and energy, was the organizer of what today is internationally known as the American Printing Company, but which was established in the spring of 1833, as the American Print Works, the project being financed by Mr. Borden, and a group of stockholders of the Fall River Iron Works Co.

The original plant began operations in January, 1835, with four printing machines and a capacity of 2,500 pieces a week, most of which were block printed by hand.

There are those who claim that Massachusetts has made no textile development worthy of the name within the past quarter of a century or more, but it is interesting to note that today the Fall River plant of the American Printing Co. has 42 printing machines in operation, that in the local cotton mills division of the plant it utilizes 1,063,000 square feet of manufacturing space, and in the print works division 868,000 square feet of area, a total of 1,931,000 square feet, while in the subsidiary unit, operated as the Borden Mills, Inc., at Kingsport, Tenn., there are 386,000 square feet of manufacturing space, and in the two cotton mill divisions at Fall River and Kingsport, the company manufactures 1,750,000 yards of cotton cloth every week, depending on the styles of fabrics then running on the looms, or a total of approximately 100,000,000 yards per annum.

The products of the print works division are variable, depending on the styles of goods that are in demand, and the quantities of each style ordered, but today the annual production easily runs to 288,000,000 yards yearly, although the company can and did, during the month of December, 1928, turn out 1,000,000 yards a day of printed and dyed goods, or at the rate of 300,000,000 yards a year. The size of this production may best be gauged by the fact that it amounts to almost a mile of goods every 60 seconds.

Producing about half of its cloth requirements at its Fall River and Kingsport plants it buys the remainder of the coarser goods in Fall River and the South, and the fabrics of finer construction, in New Bedford. It turns out some products of rayon and cotton mixtures, and within recent years it has been doing an increasing business with many of the leading chain stores. It employs on the average 4,650 operatives at Fall River, of which total 2,250 are in the cotton mills division, and 2,400 in the print works, while at Kingsport, about 800 employees are carried on the day and night shifts.

The present day equipment at the Fall River plant consists of 360,392 spindles, 5,798 broad and 2,562 narrow looms, and 50 boilers, while at Kingsport there are 88,648 spindles, 1,958 broad looms, 157 cards, and two boilers.

Twenty years after its inception, the company had a capacity of 9,000 pieces of cotton cloth per week, while in 1870, the twenty printing machines then operated by the company had a capacity of but 80,000,000

yards of cloth a year, and even in 1916 the concern had a capacity of printing but approximately 1,350,000 yards per week, as against from 2,500,000 to 2,750,000 yards today.

The untimely death of Holder Borden, the promoter of the enterprise, in 1837, at the age of thirty-eight years, brought Jefferson Borden into a prominent part in the management, and for 39 years he served as its agent.

In 1840 additions to plant and equipment almost doubled its previous capacity. In 1857 the company was incorporated as the American Print Works, and Col. Richard Borden became president, a position he held until his death in 1874.

In 1858, large areas of realty were purchased from the Fall River Iron Works Co., and the same year Richard and Jefferson Borden bought for the corporation the plant and business of the Bay State Print Works, which had grown to be a big concern. Both units were operated under one management until 1876, when the Bay State plant was converted into a cotton mill.

In December, 1867, the boiler house and machine shop, and much of the machinery and stock in the Bay State unit were destroyed by fire, and within a month the most valuable part of the American Print Works plant, which had been rebuilt of Fall River granite, was burned, the fire occuring the day before the new unit was to be occupied. The loss occasioned by these disastrous fires was upwards of $2,000,000. At ten o'clock on the morning of the day following the last fire, 300 workmen began clearing away the ruins, and sixteen months later a new granite building, 460 feet in length by 60 feet in width, five stories high, was ready for occupancy.

With the completion of this structure, the combined length of it and the main print works was 1,152 feet, while the two boiler houses, the dye houses, carpenter and chemical shops, all built of granite, if placed in direct line would have presented a solid wall of masonry 2,055 feet in length, the complete plant covering 816 square rods of land.

In 1876, Jefferson Borden, a son of Col. Richard Borden, and a brother of Matthew C. D. Borden, became agent of the company.

Matthew C. D. Borden, son of Col. Richard Borden, was an industrial builder whose faith in Fall River was so great that when the aftermath of the panic of 1873 threatened to engulf the great enterprises that had been reared by his father, he assumed responsibility for the future guidance of the business of the American Print Works.

His father had died in 1874 and five years later the disasters flowing in the wake of the hard times necessitated the making of the first contribution of new capital to the Borden enterprises, as previously the profits had furnished all the additional money for extensions, and to care for the great fire loss of $2,000,000, which had been sustained, in 1864. The corporation was obliged to ask extensions from its creditors in 1879, and M. C. D. Borden who had been the New York agent for some years assumed the liability, with his brother, Thomas J. Borden, and in 1880 incorporated the American Printing Co.

In 1886 Thomas J. Borden disposed of his interest to his brother and M. C. D. Borden at once added to the business of printing, by providing for the manufacture of the fabrics to be printed, thus rendering himself independent of the exactions of those producing print-cloth. For this purpose he bought, in 1881, the idle property of the Fall River Iron Works Co., and at the same time secured control of the water privileges

which the charter of the Iron Works unit embraced, by purchasing a controlling interest in the stock of that company. He also bought contiguous land, thus securing deep water and dock privileges on his own property and in 1889 he built Mill No. 1, four stories high and of brick construction—the first of seven great cotton weaving mills erected by the concern.

Mill No. 2, a three-story structure, followed in 1892; Mill No. 3, four stories high, the next year; Mill No. 4, four stories high, in 1894, these four units containing 840,000 square feet, housing 265,000 spindles, 7,700 looms, and 377 cards—sufficient capacity to turn out 53,000 pieces of cloth per week, spun and woven from 1,000 bales of cotton.

In 1901, the Metacomet Mills, erected in 1847, were acquired from the Fall River Machine Co., and the stone building, four stories high, was enlarged and in it were installed 23,840 spindles, and 591 looms, and it became Mill No. 6.

In 1902, M. C. D. Borden, built Mill No. 5, 372 by 165 feet, of brick construction, and purchased from the Fall River Iron Works Co., the old Annawan Mills, incorporated in 1825, which he tore down in 1905, and erected Mill No. 7, 310 by 142 feet, three stories high on one side and four on the other.

With this immense plant Mr. Borden was in a position to produce calicoes, which established the market prices of the world on that class of goods, at once making him independent of any combination the print-cloth manufacturers might create.

When the American Printing Co. was incorporated, in 1880, Mr. Borden became associated in the selling end with Messrs. Wright, Bliss & Fabyan, afterwards known as the Bliss, Fabyan Co., but on July 1, 1910, the distributing and selling house of M. C. D. Borden & Sons, Inc., was created, which still handles the products of the Fall River corporation.

Formerly known as the largest printer of 28-inch cloth in the world, and marketing these products wherever such fabrics were worn, the American Printing Company manifested the same adaptability in changing its goods when the demand for such fabrics subsided as other Massachusetts concerns have shown.

Immediately after the plant ceased its war-time production, its owners showed no hesitancy in spending between $6,000,000 and $7,000,000 in re-equipping the plant to turn out all types of printed textiles in narrow and wide lengths for dress goods, and supplementing this effort its progressive selling house—M. C. D. Borden & Sons, Inc.,—has sponsored a Universal Picture film, demonstrating the new cotton vogue, in which famous motion picture stars disport themselves in a renaissance of cotton fabrics. In 1928 and 1929 the company made a substantial contribution to the rejuvenation of King Cotton as a vehicle for beautiful dresses by carrying on home dress-making contests, awarding substantial cash prizes in a nation-wide campaign, which ended with an elaborate cotton pageant at Universal City, California, thus affording full many a maid who thought herself born to blush unscreened an opportunity to achieve a place in the celluloid sun by having the gowns fashioned by her nimble fingers worn by the stars of the movie heaven.

The films of the Universal pageant were shown in 15,000 theatres in the United States, and in civilized countries the world over.

In 1929 the company purchased the water rights of the Pocasset Man-

ufacturing Co. and of the Troy Cotton and Woolen Manufactory, on the Quequechan River.

The American Printing Co. is capitalized for $2,000,000 and Bertram H. Borden is president, Howard S. Borden, vice president and treasurer, Nathan Durfee, vice president and plant executive; John L. Borden and N. Barry Durfee, assistant treasurers, and Edward W. Clarke, clerk, of the immense Fall River plants.

ONE HUNDRED YEARS AGO, AND TODAY

In 1833 Fall River possessed in her 13 cotton plants 31,500 spindles, 1,050 looms, and employed 1,276 hands, as compared with 3,647,223 spindles and 31,353 employees at present.

That year the annual cotton production in Fall River was 9,160,000 yards, the largest unit being the Massasoit, which boasted 10,000 spindles, 350 looms, employed 400 operatives, and which used 810,000 pounds of cotton. The cotton locally consumed that year amounted to 2,290,000 pounds. The calico works employed 260 hands and the Annawan Iron Works and a small nail factory, consumed 1,000 tons of iron annually.

In 1840, the Conanicut Mills were organized and built by Oliver Chace, as a thread-producing unit, becoming incorporated in 1880, to engage in the manufacture of fine cotton. In 1928, the mill at that time equipped with 29,808 ring and 416 twist spindles, 781 looms, 48 cards, and five boilers, was purchased by the Massachusetts Thread Co., of Boston, which began the operation of the plant, in October of that year, with 250 employees, yarns and threads mainly for the shoe trade being produced. Much new machinery was installed and many alterations were made in the plant, which had been idle for three years. The Mount Hope Mills were also erected in 1840.

In 1844, the Fall River Iron Works Company decided to erect what became known as the Metacomet Mill, which was completed and operated three years later, iron posts and girders being used for the first time in this country in the construction of the plant. Tradition is to the effect that the mill paid the cost of its construction from the profits of one year's operations. The concern was not incorporated until 1880, when it had capital of $288,000. The plant was then equipped with 29,712 spindles and 716 looms, and employed 350 hands. In 1843, the Massasoit Steam Mill, principally owned by Nathan Durfee, was erected.

THE KILBURN, LINCOLN MACHINE CO.

In 1844, Kilburn, Lincoln & Co. was formed, to manufacture cotton machinery. One of its early products was a new high speed loom, 926 of them weaving 14,229,219 yards of cloth in 301 working days of ten hours each, an average of 114.10 yards a loom per day.

In 1847, Elijah C. Kilburn came to Fall River and assumed charge of the concern, which operated under the name of E. C. Kilburn & Co. up to 1856, when it was incorporated as Kilburn, Lincoln & Son. In 1867 a new plant was erected, and the concern was incorporated as Kilburn, Lincoln & Co., with $80,000 capital, specializing thereafter in the manufacture of the Kilburn-Lincoln loom. Its corporate successor—the Kilburn, Lincoln Machine Company,—today employs 150 operatives, in the manufacture of looms and castings, being capitalized for $100,000. Leontine Lincoln is president, and B. B. Read, treasurer.

In 1845 the Wyoming Mills were built by Augustus Chase and William B. Trafford, the former becoming the sole owner a few years later. Cotton

twines, bats, and carpet warps were manufactured, and in 1890 the mills were incorporated, with $60,000 capital. During the eighties they were operated as "Marshall."

In 1849, the Quequechan Mills, were formed—the second local textile unit of that name,—the first concern having been acquired by the Pocasset Mfg. Co.

In 1850, David A. Brayton and Silas Bullard erected the Bristol County Flour Mills—the first industry of its kind in Bristol County.

THE AMERICAN LINEN CO.

The forefathers brought their spinning wheels with them when they came to this country, and linen fabrics made by hand were among the first to attain some degree of perfection here. It was the pride of the colonial dames to have stores of household linen, not only for their own use, but as part of the outfit for their marriageable daughters. The introduction of cotton fabrics made by machinery gradually limited the production of home-made linen, until the distaff was at last laid aside, and the loom cast out as being superfluous. However, this country continued to consume linen goods in large quantities and in various forms, obtaining the supply from all parts of Europe, but chiefly from Russia, Holland, Flanders, Switzerland and Great Britain. Nearly all these fabrics thus imported were produced by hand, and not until about the middle of the nineteenth century was flax machinery introduced.

The American Linen Company was promoted by Jefferson Borden and was incorporated in 1852, with a capital of $500,000, Mr. Borden becoming its first treasurer. The venture was the first attempt in this country to manufacture linen goods on a large scale. Richard Borden became president of the concern, and Lazarus Borden, the superintendent. A plant was built, the main mill being 300 feet long, 63 feet wide, four stories high, with a three-story heckling house, 150x48 feet, a bleach house, 176x75 feet, and a finishing building, 176x45 feet. At the outset 10,500 spindles were installed, with 250 looms, and in 1856 there were 521 employees. The plant had a capacity of 500 to 700 tons of raw flax annually.

Inducements were offered the American farmers to extend flax cultivation and to preserve the fibre. England and Russia had hitherto been the chief sources of supply. It was ascertained that farmers in the West raised flax simply for the seed, and burned the fibre for manure, or threw it into the public highways. It was estimated that in one Ohio county the product of 80,000 acres was annually wasted. The Fall River plant produced crash, diaper, huckabuck, sheetings, pillow case linen, blay linen, napkins, table linen and the very best quality of linen for men's suitings.

Its present day products are cotton cloths in print cloth numbers. The corporation has capital of $800,000, and the two mills comprising the plant are equipped with 95,776 ring spindles, 167 cards, 2,600 looms, and fifteen boilers, and employ 825 hands.

THE ESTES MILLS

In 1852, the Estes Mills were established, but it was not until fifty-three years later that they were incorporated, with capital of $300,000. In 1905 the absorbent cotton business of the Seaside Mills of Tiverton, R. I., was bought and moved to the Estes plant, which was enlarged at that time, and in 1910 the Cutler Mills, of Warren, R. I., were bought by the Fall River concern.

The plant is equipped with 7,000 ring spindles, 368 braiders, 14 pickers,

four boilers, a water wheel, 376 cards, and complete dyeing and bleaching departments. Mops, calking, machinery waste and cotton yarns are produced, and 400 hands are employed. J. E. Estes is president and treasurer, and Frank W. Matleson, superintendent.

JAMES HOLDEN, INC.

In 1854, when Fall River had become a city of 12,000 population, James Holden began manufacturing, but the concern now known as James Holden, Inc., was not incorporated until 1912. It has capital of $25,000, is equipped with three cards, 1,000 ring spindles, 350 braiders, and two pickers, and employs 50 hands. Grace Holden is president, and James Holden, treasurer and general manager, and the company produces cotton rope, clothes lines, and solid braided shade, sash and trolley cords.

In the fifties, the Fall River Foundry Co. manufactured the Venetian Air-Tight cook stove, for use with wood or coal, and the "Firestone State" portable grates, parlor ovens, cylinder stoves, sinks and hollow ware.

THE UNION COTTON MFG. CO.

In 1859, the Union Mill Co. was established, one of the first, if not actually the first local cotton enterprise financed by stock publicly subscribed. The enterprise was promoted by Robert K. Remington, Charles O. Shove, and S. A. and Oliver Chace.

In 1879, it was incorporated as the Union Cotton Mfg., Co., with capital of $1,200,000 and manufactures print cloths, plain quills and sateens. It employs 900 hands today, and three mills comprising the plant are equipped with 109,144 ring spindles and 3,030 looms.

James A. Burke is president, and John C. Judge, treasurer and clerk.

THE MILLS ESTABLISHED IN THE SIXTIES

The textile development in the sixties was little short of phenomenal, eight cotton concerns, many of them of large capitalization, being formed.

The Granite Mills were incorporated March 3, 1863, with capital of $225,000, to manufacture cotton goods to order, William Mason becoming the first president, and Charles O. Shove, the first treasurer. Manufacturing operations were not begun until 1865, and ten years later, Charles M., son of Charles O. Shove, was chosen treasurer, following the death of the latter.

The two mills which made up the plant had 62,564 ring spindles, 2,167 looms, and 26 boilers, and manufactured plain and fancy cotton goods, and fine and medium yarns, marquisettes and broadcloths. In 1927 the corporation was reorganized, the capital being reduced from $1,250,000 to $625,000. In 1929 the concern passed into the hands of a receiver.

E. B. Varney is president, J. S. Brayton vice president, W. R. Gilbert, assistant treasurer, and Ira Hayes, superintendent.

In 1866, William H. Jennings organized the Merchants Manufacturing Co., to engage in the manufacture of print cloths and fabrics, the original capital of $800,000 being subscribed within two days. Mr. Jennings became its first treasurer and held the office until he resigned in 1882, at which time the plant was the largest producer of cotton goods under one roof, in Fall River.

It is made up of three large mills. In 1867, it was incorporated, and in 1893 absorbed the Crescent Mills.

This corporation today has capital of $1,500,000, employs 1,050 operatives, and the plant is equipped with 139,176 ring spindles, 3,216 looms,

225 cards, and sixteen boilers, and ranks as one of the largest cotton units in Fall River, producing cotton cloths, in print cloth numbers, and even finer.

Edward B. Jennings is president, J. E. Osborn, treasurer, and John T. Balmer, superintendent.

The Robeson Mills were formed in 1866, with capital of $260,000, and were acquired by the Luther Mfg. Co. in 1903, being equipped at that time with 22,960 spindles, 650 looms and employing 230 operatives.

Few men contributed more to the upbuilding of the efficiency of Fall River cotton mills than William C. Davol who, on a trip to England, in 1838, with his uncle, Bradford Durfee, arranged to introduce into the United States the Roberts and Sharp self-acting mule, which had revolutionized the whole process of mule-spinning in Great Britain. In July 1840, he entered the firm of Hawes, Marvel & Davol and began the manufacture of the English mules, and other cotton machinery, and within six years thereafter he had built devices having an aggregate capacity of 180,000 spindles. He made many improvements upon the original machine and in 1847 constructed mules having a capacity of 100,000 spindles, while in 1852 and 1854 he perfected new mules, embodying original principles, and adapted them to spinning the finest of yarns. Carding machines, speeders and drawing frames followed, Mr. Davol receiving a patent in 1843 on a double-speeder, and on December 1, 1866, with 18 others formed the Davol Mills, with original capital of $270,000, engaging in the manufacture of shirtings, sheetings, silesias, and fancy cotton fabrics.

Mr. Davol became the first president of the corporation. In 1880 the company was reorganized, with $400,000 capital and at that time the two mills had 46,008 spindles, 1,158 looms and employed 425 operatives.

Today, the concern employs 1,000 hands, has capital of $1,500,000 and the plant, made up of four mills, is equipped with 128,768 ring spindles, 2,920 looms, and 188 cards, and now produces fancy cotton fabrics and medium fine goods. Simeon B. Chase is president, Jerome C. Borden, is vice president, M. R. Brown is treasurer, and Herbert Smith, superintendent.

The Tecumseh Mills were established in 1866 to manufacture odd goods. On February 15, 1866, the Durfee Mills were founded by David A., and John S. Brayton, and Bradford M. C. Durfee. Eleven acres of land were purchased and Mill No. 1 was completed and placed in full operation in 1867. Mill No. 2 was finished in 1871, and Mill No. 3 was erected in 1880, the three units constituting at that period the largest print cloth works within a single enclosure in this country. The mills were not incorporated until 1886, when they had capital of $1,500,000.

Today, the plant consists of five mills and has 151,328 ring spindles, 3,645 looms, 18 boilers, and employs 1,150 operatives in the production of print cloths, odd goods, sateens, linings, shirtings, tobacco cloths, carded twills, and other fabrics. Israel Brayton is president, and Frank P. Coolidge, secretary and treasurer. The company's capital remains at $1,500,000.

The Davis Mills were established in 1866, and were incorporated in 1902. The corporation has capital of $2,500,000, and employs 900 operatives in the manufacture of fine and fancy cotton goods, the two mills comprising the plant being equipped with 130,368 ring spindles, 2,549 looms, 183 cards, 74 cotton combs, and twelve boilers.

Jonathan T. Lincoln is president, Frank L. Carpenter, treasurer, and C. C. Canfield, superintendent.

In 1868 the Mechanics Mills were formed to produce cotton goods to order, and a few years ago the plant was bought by the Weetamoe Mills.

NINE LARGE COTTON MILLS FORMED IN 1871

In 1871 the Crescent Mills were established to produce sheetings and special sizes of fine goods for printing and converting, and twenty-two years later this unit was absorbed by the Merchants Manufacturing Co.

The Slade Mills founded by William L. Slade, who remained at their head for 24 years, were formed in 1871, to manufacture print cloths, becoming the Ancona Mills, in 1903. The latter corporation was liquidated in 1928.

THE WAMPANOAG MILLS

The Wampanoag Mills were organized on May 31, 1871, with capital of $400,000, the founders being Messrs. Stephen Davol, John D. Flint, William H. Jennings, Lloyd S. Earle, Walter C. Durfee and Robert T. Davis.

The first board of directors consisted of Messrs. Robert T. Davis, president, J. D. Flint, W. C. Durfee, Stephen Davol, Foster H. Stafford, Simeon Borden, George H. Eddy, Alphonso S. Covel, Lloyd S. Earle, William H. Jennings and John H. Boone, and Walter C. Durfee was elected treasurer and general manager.

The original equipment consisted of 28,000 spindles and manufacturing operations were started in March, 1872. In 1877 another mill was erected and in 1891 a weave shed of two stories was added. The present equipment of the three mills includes 73,568 spindles, 1,994 looms, 143 cards, and seven boilers, and the products include plain gauze, sateens and twills, and fancy fabrics of curtain goods and rayon specialties, and 650 operatives are employed.

Walter C. Durfee was treasurer until 1891, when he was succeeded by Effingham C. Haight. William Evans succeeded to the office in 1901, W. Frank Shove, in 1905, Russell H. Leonard, in 1915, and Albion C. Cook, in 1922.

The corporation has had eight presidents in the almost 59 years of its existence—Robert T. Davis, Robert C. Davis, Franklin L. Almy, George H. Eddy, William H. Jennings, Jr., and W. Frank Shove, who today heads the concern.

The capital stock was increased in 1877 to $500,000, in 1886, to $750.-000, and in 1923, to $1,000,000.

The present board of Directors consists of Messrs. W. Frank Shove, president, and William H. Jennings, J. Edward Newton, Melvin B. Horton, Henry Ashworth, Herbert H. Hewitt and Albion C. Cook. W. F. Shove is president and A. C. Cook, treasurer and clerk.

The Narragansett Mills were formed in 1871 with original capital of $400,000, to produce print cloths, jeans, and other fabrics, and were incorporated the following year. The corporation is capitalized for $600,000, and employs 450 operatives in the manufacture of print cloths, twills, sateens, and umbrella cloths, the plant being equipped with 55,816 ring spindles, 1,464 looms, 82 cards, and five boilers. Edward S. Adams is president, Isaac A. Brown, treasurer, and Jabez Wilkinson, superintendent.

In 1871 the Weetamoe Mills were incorporated to manufacture print cloths and odd goods. Today the two mills of the corporation employ 750 operatives in producing plain and fancy cotton fabrics, and are equipped with 88,496 ring spindles, 2,116 looms, 166 cards, and fifteen boilers.

E. B. Varney is president, John W. Davis, treasurer and secretary, and J. C. Mailloux, superintendent, of this corporation, which has capital of $1,250,000. On February 6, 1929, the directors were authorized to liquidate the concern.

The Stafford Mills were incorporated in 1871 to produce print cloths and odd goods, and now have capital of $1,000,000. The two mills of the plant are equipped with 114,408 ring spindles, 2,769 looms, 156 cards, and seven boilers, and employ 850 operatives in the manufacture of print cloths and other cotton fabrics, and dobby work. F. Stoddard Mathewson is president, Thomas R. Burrell, vice president, Sydney H. Borden, treasurer, and Byron E. Eddy, superintendent.

The Chace Mills were incorporated in 1871 to manufacture twills and bleached goods, and at the time of the purchase of the assets of the concern by the United Merchants & Manufacturers, Inc. in 1929 the two units of the plant were equipped with 86,192 ring spindles, 1,871 looms, and twelve boilers, and employed 850 hands in the production of sateen specialties, print cloths, wide goods, and shade cloth. The new owners announced that $500,000 would be expended in revamping the plant with automatic machinery, and that it would be operated on double shifts in producing marquisettes and shade cloths. A bleachery, and printing and dyeing departments, were also added.

The Montaup Mills were established in 1871 to manufacture seamless bags, cotton bats and ducks.

The Richard Borden Manufacturing Company was incorporated in 1871, with capital of $800,000, and Mill No. 1 was erected that year, in which 42,528 spindles were installed. This concern was unique in that there were but twelve original stockholders, Richard Borden was chosen as the first president, and Thomas J. Borden as the first treasurer. In 1889, Mill No. 2 was erected, and 37,288 spindles were added. Since then various plant additions have been made until today the company operates 99,680 spindles, 2,252 looms, and six boilers, and employs 650 operatives. In 1907, the capital stock was increased to $1,000,000.

The products of today are marquisettes, voiles, sateens, fancy curtain fabrics, print cloths, and wide goods. Richard P. Borden is president, Charles N. Borden, treasurer and clerk, and Vernon L. Faulkner, superintendent.

FIVE MILLS AND A BLEACHERY ADDED IN 1872

The King Philip Mills were incorporated in 1872, with $500,000 capital, to manufacture cambric muslins, sateens, lawns, and fine high-count goods. Elijah C. Kilburn becoming its first president. The first mill building was not built until March, 1873, and in June 1881 the capital was increased to $1,000,000 and Mill No. 2 was erected in 1882.

The concern has grown until it occupies four mills and is now capitalized for $2,250,000, is equipped with 130,464 ring and mule spindles, 3,134 looms, and employs 1,175 operatives in the production of plain and fancy sateens, broadcloths, voiles and other fabrics.

Indicating that age does not wither, nor custom stale all of our textile concerns it is well to point out that if in 1910 an investor had purchased six shares of the common stock of the King Philip Mills, which would have cost him $1,020, he would have received in the eighteen intervening years $2,043 in cash dividends which have been paid regularly without interruption, as well as a stock dividend of 50 per cent, thus giving him nine shares. Based on the approximate price of the shares on January 1,

1927, the total appreciation of the principal in the interim would be $105 and the combined value of the investment including cash and stock dividends would be $3,168, the average return to shareholders figuring the stock dividend at the present market being $2,192 per share. On September 1, 1926, the company had a surplus of $1,781,554.

Oliver S. Hawes is president, S. B. Chase, treasurer, William A. Ramsbottom, clerk, and R. G. Riley, superintendent.

The Border City Mfg. Co. was incorporated in 1872, and reorganized in 1880, originally producing wide goods and specialties.

Today, 1,000 operatives are employed in manufacturing sheetings, shirtings, crepes and fancy cotton fabrics, the corporation having capital of $1,800,000, and operating 101,502 ring and twist spindles, 2,695 looms, 189 cards, and 17 boilers.

Israel Brayton is president, and William L. S. Brayton, treasurer.

The Flint Mills were established in February 1872, with capital of $500,000, to produce cotton goods to order, and now employ 900 operatives in the manufacture of print cloths, sateens, and tobacco cloths. The plant, which consists of two mills, is equipped with 107,296 ring spindles, 2,454 broad looms, 160 cards, and ten boilers, and the corporation has capital of $1,160,000.

From 1900 to 1926, inclusive, the common stock of the Flint Mills, paid an average yearly return to stockholders, figuring the stock dividend of 1922 at its present selling value, of 11½% and since 1909 the concern has increased its surplus, which, in October, 1926, was $703,477, by $577,488, notwithstanding the fact that in 1922 a 50 per cent stock dividend was declared which meant a surplus reduction of $580,000.

William H. Jennings is president, J. Whitney Bowen, treasurer, and P. E. Victory, superintendent.

The Shove Mills were established March 4, 1872 to engage in the manufacture of print cloths and odd goods, and today have capital of $1,200,000.

Equipped with 77,728 ring spindles, 1,946 looms, 102 cards, and twelve boilers, the corporation employs 650 operatives, in the production of print cloths, bag goods, tobacco cloth, dobby goods, dress fabrics, gauze, flannels, sateens, shade cloths, crash and towels. John A. Miller is president, C. C. Rounseville, secretary and treasurer, and Richard G. H. Knight, superintendent.

The Osborn Mills, Inc., were established in 1872, by Weaver Osborn, who became its first president, serving in that capacity until 1894. Fine and fancy goods, and print cloths were produced. The concern had original capital of $600,000, which later was increased to $750,000, and within recent years the manufacture of lawns, sheetings, and umbrella cloths engaged the attention of 650 operatives. The plant has 1,596 looms, 61,712 ring spindles, and three boilers.

James E. Osborn is president, Frederick Webb, treasurer, and Charles H. Durfee, secretary.

In 1872, the Fall River Bleachery was established by the late Spencer Borden, and for almost sixty years has been in continuous operation in bleaching, dyeing and finishing all kinds of white goods, having a capacity at the present time of sixty tons per day. Mr. Borden served as its treasurer from 1873 to 1899. The corporation has capital of $1,500,000, employs 600 operatives, and maintains offices in Boston and New York. Spencer Borden, son of the founder, is president and treasurer, George O. Lath-

rop, secretary, Jefferson Borden, Jr., vice president, and E. Gordon Thatcher, superintendent.

THE BARNARD AND SAGAMORE MANUFACTURING CORPORATIONS

The Barnard Manufacturing Company was incorporated October 14, 1873, with capital of $330,000, to manufacture plain twill sateens and fancy goods. N. B. Borden, II, was chosen treasurer and the original equipment consisted of 28,000 spindles and 768 looms. In 1895, thirty thousand more spindles were installed, and a new weave shed erected, which housed about 1,800 looms. In 1896 the spindlage of the plant was 64,500, and there were 1,708 looms in operation.

The concern has capital of $1,250,000 at the present time, and the plant is now equipped with 80,304 ring and 2,308 twist spindles, 1,780 broad looms, 120 cards, four boilers, and employs 850 operatives in the production of twill and fancy cloth.

William H. Jennings is president, J. Edward Newton, treasurer, and Arthur Turner, assistant treasurer.

Then there came a lull in the formation of new local textile units, due to the financial depression of 1873, which swept the country, and no additions were made to the textile concerns until 1875 when the Fall River Merino Co. was formed, a corporation that long since passed out of existence.

In 1879 the Sagamore Manufacturing Co. was established and began the manufacture of print cloths. Today, the unit is one of the large textile corporations of the city, operating three mills, and having capital of $3,000,000, and 1,300 employees. The plant is equipped with 147,664 ring spindles, 3,554 looms, and 24 boilers.

James M. Morton, Jr., is president, William L. S. Brayton, treasurer and James A. Burke, superintendent of this progressive concern, which stands as a conspicuous example of a well-managed textile unit, in which an investor has justification for placing his capital.

If a person with $1,000 to invest, had bought, in 1910, seven shares of the common stock of the Sagamore unit, then selling for $150, he would have received between 1910 and 1926, inclusive, cash dividends amounting to $2,613; stock dividends in the same period of 66⅔ per cent, giving him 11⅔ shares in lieu of the original seven, and on January 1, 1926, when the stock was selling at $155 a share, there would have been a total appreciation of principal in the interim of $757, giving a combined value on the original investment of $1,000, including cash and stock dividends, of $4,420. Had the same person taken his $1,000 in 1910 and invested that amount in a first mortgage 6 per cent bond the value of the same on January 1, 1927, determined on the same basis of computation, would have been but $2,100, thus showing an investment in a New England industrial stock appreciated in this instance to more than twice that of a bond.

The average return to shareholders of the Sagamore unit over a period of 20 years, figuring the stock dividend at the market is $26.90 per share.

In 1881, the Crystal Spring Bleaching & Dyeing Co. was established to dye, bleach and finish white goods and indigoes.

On April 16, 1881 the Globe Yarn Mills were incorporated with capital of $175,000, which later was increased to $200,000, then to $350,000, and in 1885 to $600,000, in which year Mill No. 2 was erected, William H. Jennings being the first president of the corporation. In 1889 the plant was acquired by the New England Cotton Yarn Co.

THE BOURNE AND LAUREL LAKE MILLS

In 1881 the Bourne Mills were incorporated with capital of $400,000, and are engaged in the manufacture of twills, sateens, and other cotton fabrics, the plant, which consists of two mills, being equipped with 91,436 ring spindles, 2,612 broad looms, and fourteen boilers, and employs 700 hands. The corporation now has capital of $1,000,000, Fenner A. Chace is president, and George Delano, treasurer.

The same year the Laurel Lake Mills were incorporated with capital of $400,000 by John P. Slade, R. T. Davis and Henry C. Lincoln, to produce print cloths and odd goods.

The plant now employs 525 operatives, and 58,544 ring spindles, 1,628 looms, 87 cards, and three boilers are operated in manufacturing prints and yarn, the company having capital of $900,000. Everett N. Slade is president, and Paul Gifford, treasurer.

THE MASSASOIT MANUFACTURING COMPANY

In 1882 the Massasoit Manufacturing Company was founded, its mill occupying the site of the Massassoit Mill, built in 1843, and burned in 1875.

As is observed in many another Massachusetts industry this corporation dates back, through many generations, in the same family. Its origin can be traced to the founding, in 1792, of a small factory at Palmertown, Conn., by Elder Reuben Palmer, the successful operation of which by each succeeding generation of the Palmer family up to the present furnished the manufacturing training and the stimulus of the organizers of the Massasoit Manufacturing Company.

A new development in the industrial history of the family arose through a study of the possibilities of the manufacture of various products from cotton mill waste. This new and but little explored field aroused the interest of the Palmer brothers and the Turner brothers, and their experiments resulted in 1882 in founding the Fall River concern by Wendell E., and William H. Turner, and Elisha L., Edward A., and Frank L. Palmer.

The raw stock,—cotton mill waste,—in large quantities, and accessible at first hand without transportation charges, was the basic consideration in establishing the industry there.

The founders realized that the textile manufacturing center of the United States was at Fall River, with its large-scale textile mills, concentrated labor supply, and splendid water and rail shipping facilities. The rapid expansion of the company and its continuous success for almost half a century, to the present complete manufacture of its products is evidence of the wisdom of the choice, and the soundness of the enterprise.

About thirty years ago the company was asked by United States government representatives to coöperate with them in securing a specially prepared cotton. To provide the commodity it was necessary to meet strict chemical and physical tests. This was accomplished, and a large initial order was followed by many others from the government. Officials of the company immediately realized the possibilities of specially prepared cotton for a variety of commercial uses. The development of gun cotton by the government and powder manufacturers afforded an opportunity to prove the value of the product and they worked in intimate coöperation with others to secure the desired results.

While experimental work was going on in the manufacture of gun cotton, other nitro cellulose industries were developing rapidly, and the Mas-

sasoit concern was fortunate in being able to work in close touch with a number of these, and to enjoy the benefits of their fullest coöperation. This, together with past experience, aided the company in building up a substantial business in a comparatively short time.

At the outbreak of the World War in 1914 the Massasoit unit was one of the few manufacturers equipped to prepare cotton suitable for the manufacture of gun cotton, and during hostilities they operated three plants in the manufacture of this type of material, with a yearly production of approximately 15,000,000 pounds.

With the return of peace the concern continued to operate its original plant, meeting the strict individual requirements and specifications of manufacturers of powder, soluble cotton, artificial leather, lacquers, photo and motion picture films, artificial silk, or any article requiring a high or low grade of bleached or prepared cotton as a basis, or raw stock. The Massasoit Manufacturing Co. has grown from a local business, with one small factory, capitalized at $50,000, to a $1,000,000 industry, whose products are distributed throughout the United States and many foreign countries, and is now operating four large plants in Massachusetts and Connecticut.

The present day products are waste, mops, cloths, wicking, caulking cotton, clothes lines, bleached and chemical cottons, and cotton yarns for insulation.

Branch offices are maintained in New York, Chicago and Philadelphia, and the company employs 400 operatives. The Fall River plant is equipped with 10,500 ring spindles, 150 cards, 12 waste machines, 7 boilers, two water wheels, and a complete bleachery. Robert W. Powers is president and treasurer, and John Foley, assistant treasurer and clerk.

OTHER LOCAL MILLS ESTABLISHED IN THE EIGHTIES

In 1882 the Grinnell Mills were built, Edward Kilburn becoming the first president of the corporation. The concern long since passed out of existence.

The same year the Barnaby Manufacturing Co. was established, with capital of $400,000, to manufacture fine colored cotton goods.

In 1884 the Seaconnet Mills were incorporated, with capital of $600,000, to produce odd goods, and are now operated as the Howard-Arthur Mills. The plant is equipped with 72,464 spindles, 1,574 looms, 99 cards, and eight boilers and employs 200 operators.

Elias Reiss is president and treasurer and David Ginsberg is clerk.

The Small Bros. Mfg. Co. was established in 1885 and incorporated in 1919, with $200,000 capital. Mill banding, corset and shoe laces, tubular braids and flat spool braids are produced, the concern employing 250 workers, and operating 4,500 braiders. E. H. Small is president, R. C. Small, treasurer, and Norman C. Small, assistant treasurer.

In 1888 the Hargraves Mills, which, in 1895, were incorporated as the Parker Mills, were established, to manufacture fine cotton goods and specialties. In the intervening years they have been developed until today the concern has capital of $2,100,000, and employs upwards of 2,000 operatives. The plant is equipped with 230,902 spindles, 5,472 looms, and seven boilers. This company has the second largest number of spindles and looms in the city, being exceeded only by the American Printing Co., and the plant consists of four large mills.

Henry Ashworth is president, Leonard S. Chace, treasurer, and Edward B. Lovell, clerk.

The Kerr Mills were established in 1888 for the manufacture of fine cotton yarns, and nine years after their formation the plant was acquired by the American Thread Company, which operates it today, as one of the two Massachusetts units of that corporation, which is capitalized for $18,000,000. Fine cotton yarns and threads are produced.

R. C. Kerr is president, and J. G. Wylie treasurer of the company, which owns the Merrick Mills, in Holyoke, the Willimantic Mills, in Willimantic, Conn., and the William Clark Mills, in Westerly, R. I. T. R. Louis is agent of the Fall River unit.

In 1889 the Cornell Mills were incorporated to manufacture sateens and odd counts, and today have capital of $600,000, employ 400 operatives, and produce twill pocketings, sateens, print, wiping and tobacco cloths, mosquito netting, and gauze. The plant is equipped with 45,040 ring spindles, seventy-two cards, 1,139 looms, and four boilers.

Fred E. Waterman, Jr., is president, Robert W. Zuill treasurer and clerk, and F. S. Akin, superintendent.

THE INDUSTRIAL DEVELOPMENT IN THE NINETIES

The Heywood Narrow Fabric Co. was established in 1890, and incorporated ten years afterwards, with capital of $40,000. Engaged in the manufacture of plain and mercerized braids, corset and shoe laces, the concern employs seventy-five operatives, and the plant is equipped with 2,000 braiders, and complete dyeing and bleaching departments. William M. Heywood is president, and Sumner Cook, treasurer and secretary.

In 1891 the Algonquin Printing Co. was incorporated with capital of $160,000. Today it is capitalized for $1,000,000, and carries 450 operatives on the rolls. The plant has fifteen printing machines, and fourteen boilers. Edward B. Jennings is president, William H. Jennings treasurer and Joseph H. Hindle superintendent.

Engaged in the manufacture of indigo blues, aniline blacks, greys, shirtings and claret prints, and maintaining a direct selling policy, it is another conspicuous example of successful textile management in Massachusetts. From 1913 to 1926, inclusive, its cash dividends ranged from 10 per cent to 50 per cent, and in 1922 the cash and stock dividends amounted to 100 per cent, yet it increased its surplus between 1909 and 1926 by the approximate amount of $1,635,000, and had a surplus of $2,127,266 and net quick assets as of December 31, 1926, of $3,428,958, equivalent to $342 per share, leaving a stock value of nil on the fixed assets.

In 1891 the Sanford Spinning Co. was established with capital of $500,000, the plant being acquired in 1899 by the New England Cotton Yarn Co., and a few years ago by the Firestone Cotton Mills, a subsidiary of the Firestone Tire & Rubber Co., of Akron, Ohio. Upwards of 900 operatives are engaged in producing tire fabrics at the plant, which is equipped with 61,344 ring and 27,588 twist spindles, 357 cards, thirty-eight broad looms, thirty pickers, and five boilers. In 1929 sixteen additional twisting machines were installed, at a cost of $56,000.

The expenditure of several millions of dollars in Massachusetts, within the past ten or twelve years by the Firestone interests, which are now operating five plants in the Commonwealth, indicates that the state is still favorably regarded as a fertile field for textile operations. Much of the time day and night forces have been operated in the Fall River plant. In May, 1929, President Harvey S. Firestone announced his intention to

expend $250,000 annually for a series of years in new equipment and extensions at the Fall River plant.

The Stevens Manufacturing Co. was incorporated in 1892, with capital of $250,000, and is engaged in the manufacture of bed spreads, of the crochet, satin, jacquard, cotton, artificial silk, and novelty types. The plant is equipped with 20,000 ring and 9,000 twist spindles, 116 cards, 450 broad looms, fifty sewing machines, and twelve boilers, as well as complete dyeing, bleaching and finishing departments. The company has capital of $1,200,000, and employs 850 operatives.

S. B. Chase is president, M. R. Brown treasurer, C. N. Chase general manager and F. A. Brady superintendent.

In 1892, the firm of Charles P. McClellan & Son, consisting of C. P. and C. W. McClellan, was established and produces awning and flat braids, laces and braided fish lines, and yacht duck, the plant being equipped with 250 braiding and ten sewing machines, and eight looms. Twenty-five operatives are employed.

Goss Brothers began the manufacture of cotton binding and clothes lines, in 1896, and the next year The Webster Loom Harness Co. was incorporated, with $10,000 capital to produce knitted cotton loom harness. William H. Jennings is president and Henry L. Marble treasurer of the concern, which employs sixty hands.

In 1897 the Arkwright Mills were incorporated to engage in the manufacture of plain and fancy goods from print yarns. The company had capital of $1,000,000 and the plant was equipped with 68,320 ring spindles, 1,460 looms, eighty-four cards, and seven boilers.

In 1929 John B. Cummings was elected president and treasurer of the Arkwright Corporation, a new company formed to operate the Arkwright Mills, but recently acquired by the United Merchants and Manufacturers, Inc., the textiles sales corporation established that year by Homer Loring. The real and personal property of the former Arkwright Mills was transferred to the new company, and automatic looms, new combers and new carding equipment were installed in 1929. Approximately 1,100 operatives are now employed, and all operations are now carried on, the cloth produced under the old management having been finished elsewhere. A bleaching, printing plant and cutting house are carried in the new company's program.

The plant is now operating with fifty-six combers and 525 automatic looms, and the present officers are George H. Waring, president; Thomas D. Covel, vice president; Brayton F. Wilson, treasurer, and Richard H. Fish, superintendent.

LOCAL TEXTILE DEVELOPMENTS OF THE PRESENT CENTURY

In 1900 the Maplewood Mills were established to manufacture bleached and absorbent cotton, and the plant has 186 cards, and two boilers. J. E. Estes is president and treasurer.

The Kilburn Mills were organized in 1904 by Edward Kilburn, who was chosen president of the corporation. The corporation has capital of $2,250,000 and employs 1,200 operatives. Henry L. Tiffany is president and George B. Knowles is treasurer and secretary.

The Luther Manufacturing Co. was incorporated in 1903, with capital of $525,000, and acquired the Robeson Mills that year. It is engaged in the manufacture of fine carded cotton cloth, and employs 450 operatives. The plant is now equipped with 52,048 ring spindles, 1,200 looms, sixty-six cards, and five boilers.

William H. Jennings is president, Thomas L. Burrell, vice president, John H. Holt, treasurer and clerk, and Charles N. Brown, superintendent.



LUTHER MANUFACTURING COMPANY, FALL RIVER

In 1906 the Lincoln Manufacturing Company was incorporated, with capital of $2,250,000, and now employs 1,200 hands in the production of fine cotton, and cotton and silk mixed goods. The plant is equipped with modern machinery throughout, and operates 133,344 ring and 15,264 mule spindles, 3,190 looms, 180 cards, and thirteen boilers.

Jonathan T. Lincoln is president, Israel Brayton, treasurer, and C. P. Heap, superintendent.

The same year the Beacon Narrow Fabric Co. was established to manufacture braids and tapes, and in 1908 the Davol Braiding Co. was formed to produce silk and mohair braids.

The Superba Towel Co. was established in 1907, and was incorporated in 1916, with capital of $60,000. It produces absorbent huck and turkish towels, and operates 120 looms, as well as bleaching and finishing departments. Sixty hands are employed. N. H. Mooney is president and Timothy Mooney treasurer.

The Hopkinson Dyeing and Textile Works were established in 1909 by Thomas Hopkinson, and are engaged in bleaching and dyeing, twenty-five hands being employed.

The Charlton Mills, of Fall River, honor the name of Earle P. Charlton, one of the five incorporators of the world's greatest chain store organization—the F. W. Woolworth Co.—of which corporation Mr. Charlton is vice president.

Incorporated in 1910 the Charlton Mills are engaged in the manufacture of fine cotton goods, and are equipped with 37,364 ring and 23,352 twist spindles, 1,480 looms, 110 cards, and six boilers, and employ 700 operatives.

The company has capital of $1,200,000, Earle P. Charlton is president, Arthur S. Phillips, vice president, James Sinclair, treasurer and secretary, and Charles Bodeau, superintendent.



PILGRIM MILLS, FALL RIVER

THE PILGRIM MILLS

On December 1, 1910, the Pilgrim Mills were incorporated, and construction was begun the following April on the plant, which consists of a three-story brick carding, combing, and spinning mill, 311 by 132 feet, a two-story weaving structure, 283 by 132 feet, a two-story picker building, 61 by 82 feet, a boiler and transformer house, 65 by 43 feet, and a two-story storehouse, 103 by 55 feet, and the first cloth came off the looms in March, 1912.

The mill is equipped with 53,568 tape-driven frame spindles, 576 twist spindles, 1,178 automatic looms, eighty-three cards, thirty-two combs, and two boilers, the power being electrical and derived from current supplied by the Fall River Electric Light Co.

The original capital consisted of $350,000 in six per cent cumulative preferred stock, and $700,000 in common stock. The 6 per cent preferred stock was retired in February, 1924, less than twelve years after manufacturing operations began, and in October, of the same year, $500,000 in common stock was issued as a stock dividend to holders of the common, in the proportion of five new shares for each seven shares owned.

Six per cent dividends were paid on the preferred stock from the date of issue to the date of retirement in accordance with the terms under which the issue was offered. Dividends on the common stock were started in October, 1916, and during the eleven years from 1917 to 1927, both inclusive, an average of 11 6-7 per cent was paid in cash as dividends on the common stock and dividends of 2 per cent each for the first three quarterly periods of 1928 were also paid—still more evidence that Massachusetts textiles are good investments.

The plant produces plain cotton cloth up to 40 inches in width, made from No. 30 to No. 80 yarn, and employs 450 operatives.

B. H. Bristow Draper is president, William H. Beattie, vice president, Arthur C. Homer, treasurer and clerk, and Godfrey Sanderson, superintendent.

THE LIST OF TWENTIETH CENTURY ENTERPRISES IS IMPRESSIVE

In 1911 the Annawan Mills were incorporated, with $50,000 capital, and produce carded cotton, willowed stock and cotton waste, the plant being equipped with 11 cards, a garnet, and four pickers. One hundred hands are employed.

Charles B. Chase is president, M. R. Brown, treasurer and Walter E. O'Hara, agent, secretary and manager.

In 1910 the Standard Fabric Co. was incorporated, with capital of $200,000, to produce braids, and shoe and corset laces. The plant is equipped with 6,000 ring and 2,000 twist spindles, 2,500 braiders, thirteen cards, one boiler, and complete dyeing and bleaching departments, and 60 operatives are employed.

Sumner Cook is president and William M. Heywood, treasurer and manager.

The Fall River Webbing Mills were incorporated in 1912 to produce tapes, braids and hospital gauze.

The Marshall Fabric Co. was incorporated in 1913, with capital of $22,000 to manufacture silk and cotton braids, hat bands, shoe laces, tapes, webbings, and laces. The plant has 500 braiders, twenty-two looms, six sewing machines, and two boilers. William Marshall is president and John Marshall treasurer.

In 1914 the Elgin Silk Co. was incorporated, with capital of $100,000, and employs 200 operatives in the manufacture of broad and dress silks, the plant being equipped with 800 spindles, eight winders and 158 plain and box looms. Samuel Abrash is president, George Abrash, treasurer and secretary, and Benjamin Abrash, assistant treasurer.

In 1916 the Foster Spinning Co. was incorporated, with capital of $300,000, and employs 150 operatives in producing combed sea island and peeler yarns. The plant has 13,312 ring spindles, forty-two cards, and twenty-four combs.

Seth Sprague is president, William L. S. Brayton treasurer and Samuel A. Fairhurst superintendent.

The Willey Braid & Lace Co. was incorporated in 1917, with capital of $20,000 to produce braided shoe laces, and now employs fifty hands. The plant is equipped with 320 braiders, and ten sewing machines.

William J. Colbert is president and superintendent, and D. F. Murphy treasurer.

In 1917 the Shawmut Mills were incorporated, with capital of $600,000, to manufacture single and twisted Egyptian and American thread yarns for knitting and weaving, and to carry on winding and twisting operations. The plant is equipped with 30,000 spindles, and two boilers.

Leonard S. Chace is president, R. B. Chace treasurer, J. E. Monks clerk and Hammond Barnes superintendent.

Winstanley Brothers were established in 1918, and produce shoe laces, operating 120 braiders. Messrs. Harold and John Winstanley constitute the partnership.

The Grinnell Yarn Mills, Inc., were incorporated in 1920, with capital of $25,000, but are now out of existence.

The Liberty Textile Works, Inc., were incorporated in 1920, with capital of $15,000, and produce broad silks, crepe de chines and georgettes, twenty-five hands being employed.

Morris Britz is president and Max Sternberg, treasurer and secretary.

In 1922 the Leigh Textile Co. was incorporated and is engaged in sorting and packing cotton waste. The company has capital of $360,000. H. Lehner is president and treasurer, and Frank K. Lewis superintendent.

The same year the Old Colony Thread Co. was incorporated, with capital of $40,250, since increased to $50,000, and employs fifty operatives in the manufacture and finishing of sewing threads, E. C. Olson being president, C. F. Waters, vice president, C. R. De Graff, treasurer and secretary, and C. W. Davis assistant treasurer.

M. J. Toohey & Co. employ fifty hands and operate 4,000 ring spindles, ten cards and 150 braiders in producing scroll, rim, spindle, spooler and loop banding, caulking cotton, sail cords, rope, twine, wicking, mops, clothes lines, wiping waste, and yarns.

The Standard Specialty Mills produce absorbent cotton, tubular gauze, tapes and sanitary napkins, and employ 100 operatives. The company operates its own bleaching and finishing departments. The concern is owned by Elmer B. Estes.

The Leno Elastic Web Co. manufactures wide webbing. J. K. Lanning is president and treasurer, and Joseph Coldwell vice president and manager.

The Walker Webbing Co. is capitalized for $150,000, and employs 200 operatives in the production of braids, laces and narrow fabrics.

John V. Moore is president, R. C. Small vice president and Arthur Henius treasurer.

In 1924 the Lasoy Silk Mills, Inc., were established, with capital of $25,000 and specializes in the production of millinery silks. Seventy looms, two warpers, three winders and four spoolers are included in the equipment. Sixty hands are employed. Solomon Rosenberg is president, Louis Ginsberg, treasurer, and W. Abramson, secretary.

The Pansy Silk Mills, of which Herbert Pansy is vice president and manager, employ seventy-five in the manufacture of broad silks, and operate 100 looms, six warpers, six winders, and five quillers.

The Watuppa Silk Co., owned by Reuben and Israel Abrash, employs thirty-five operatives in producing broad and dress silks, and the plant is equipped with fifty-two looms, two warpers, four winders, and two quill winders.

The William-Irving Silk Co. operates 116 looms in producing broad silks, has capital of $125,000 and employs seventy-five hands. Samuel Abrash is president, Irving Abrash, vice president and secretary, and William Abrash, treasurer.

THE UNITED MERCHANTS AND MANUFACTURERS, INC.

In 1928 a new policy was inaugurated by Homer Loring and his associates, resulting in the formation of the United Merchants and Manufacturers, Inc., which bids fair to bring a group of Fall River cotton concerns out of the doldrums; to stabilize production and to provide for a more or less constant market for salable fabrics, the plan recognizing what many have long believed to be the crux of the situation—the factor of proper merchandising.

The United Merchants & Manufacturers, Inc., was incorporated under the laws of the State of Delaware, in October, 1928, and has made substantial progress toward completion of an organization to manufacture, finish and market cotton, rayon and silk textiles.

Interests were acquired in three New York converting houses with national distribution and foreign markets—the Cohn-Hall-Marx Company, the Seneca Textile Company and the York Manufacturing Company. These concerns have a long record of profitable operations and a present annual sales volume of approximately 200,000,000 yards of cotton, rayon and silk products, with a sales value of about $30,000,000. Three northern mills were purchased in New Bedford and Fall River, Massachusetts, and Jewett City, Connecticut. The New Bedford mill has acquired through years of operation, a reputation for fine products not excelled by any unit in this country. The Fall River mill, when purchased, made print cloth and was re-equipped as a modern fine goods mill. It is the intention to run this mill day and night. The other northern plant acquired in Jewett City, Conn., is one of the best-known manufacturers of all-rayon cloth. Additional machinery and automatic looms were installed and the plant was equipped to meet the increasing demand for rayon products. One other northern mill soon will be acquired to manufacture special cotton products for which the converters have a steady demand. Arrangements were completed for the purchase of a group of cotton mills located in South Carolina, near Augusta, Georgia, having a total of 102,000 spindles, and engaged in producing a variety of cotton goods ranging from flannels to fine combed goods. All the mills were bought at prices far below replacement value and the acquisition of the southern units included valuable water rights required for finishing, bleaching, dyeing and printing. The

company expected to have finishing plants in operation both in the North and the South by the end of 1929.

The corporation has $5,000,000 of cumulative preferred stock, $3,500,000 of cumulative preferred stock series A, and 300,000 shares of no par value common stock.

The 1929 business of the converting houses associated with United Merchants & Manufacturers, Inc., ran substantially ahead of 1928, which year was very satisfactory. It was anticipated that seven mills and two finishing plants would be placed in complete operation during 1929.

Homer Loring, as president of the corporation has an active part in the management of its affairs, and he has associated with him as vice president, Lawrence Marx, president of the Cohn-Hall-Marx Company, one of the most successful converting houses in the country.

Despite the textile troubles a score of new industries began business in the city between 1926 and 1928, including units manufacturing broad silks, straw and felt hats, dresses, curtains, raincoats, athletic underwear, ice boats, speed boats, leather jackets, shirts and pipes.

Abatements running into many millions of dollars on mill real estate and machinery have been granted during the past few years by the municipal authorities, involving approximately 85 per cent of the spindlage, thus saving the cotton units several hundreds of thousands of dollars in taxes each year, while many plants have installed modern machinery and looms to meet style demands.

THE SHELL EASTERN PETROLEUM PRODUCTS, INC.

In 1929 the Fall River refineries of the New England Oil Refining Co., and the corporation's terminal at New Bedford were sold to the Shell Eastern Petroleum Products, Inc., a newly organized subsidiary of the Shell Union Oil Corporation. The Petroleum Products unit had previously purchased the retail gasoline distribution system of the New England Oil Refining Co., which operated throughout New England.

The new Shell Company is in effect an extension of the oil producing, refining and distribution organization which its associated companies operate in California, the Middle West, and all over the world and it will distribute in the New England territory all the Shell products.

The president of the new unit is Andrew F. Carter, former president of the New England Oil Refining Co.; vice president, William J. Filer, who had been assistant sales manager of the Roxana Petroleum Co., a Shell Union subsidiary; treasurer and secretary, Urban F. O'Brien, who was with the New England Oil Co.

The directors are J. C. van Eck, chairman, who is president and chairman of the board of the Shell Union Oil Corporation; Richard Airey, president of the Asiatic Petroleum Co., a subsidiary of the Royal Dutch-Shell group; Avery D. Andrews, chairman of the board of the latter company; Samuel F. Pryor, director of the Shell Union Oil Corporation; Andrew F. Carter, Frederick W. Allen, senior partner of Lee, Higginson & Co.'s New York office; Ulrich de B. Daley, president of the Shell Petroleum Co., which operates in the Middle West; G. Legh-Jones, president of the Shell Union Oil Co., which operates in California, and James H. Brookmire, secretary of the Shell Union Oil Co.

The Fall River refinery of the New England Oil will be improved and made efficient and modern in all respects. The Shell group paid $2,154,000 for the Fall River and New Bedford properties.

In April, 1929, Brian Brothers, of New York, manufacturers of wash

clothing for boys, began operations in Durfee Mill No. 1, and the concern is employing 600 operatives.

SOME OF THE CITY'S OTHER INDUSTRIES

While cotton textiles have predominated in Fall River from the day when the town was known as Troy there are included among the city's manufactories many concerns engaged in the production of other commodities.

Ashworth Bros., Inc., with a capital of $1,200,000 are engaged in the manufacture of card clothing, and employ 200 operatives. Robert C. Ashworth being president and Henry Ashworth treasurer of the concern.

The E. S. Parks Shellac Co., capitalized for $750,000 produces shellac, and operates a branch plant at Somerset. Edward S. Parks is president and treasurer, and Edward W. Parks secretary.

The Union Belt Co. is engaged in the manufacture of belting and loom strapping, employing seventy-five operatives. The corporation has capital of $72,000, Henry Ashworth is president, and Robert N. Hathaway secretary.

Patten Brothers, a partnership which includes Alonzo R., H. Clayton and Clarence A. Patten, with capital of $50,000, employ fifty hands in the production of laundry machinery and mill trucks.

The Hatters Fur Mill is engaged in manufacturing hatters' furs, James P. Hennessy being president, John H. Hunt vice president and John J. Smith treasurer of the concern, which employs seventy-five operatives.

The Essex Shirt Co., with capital of $50,000, employs 100 operatives in the production of men's shirts. M. M. Israel is president, and Max Leavitt treasurer of the corporation.

Franklin Hats, Inc., owned by Samuel Kanner, employs 100 hands in the manufacture of men's felt hats.

The McNally Construction Co., employing 100 skilled artisans, has long been prominent in the construction of local and vicinity mill buildings, and public and private structures. Michael McNally is president and treasurer and William W. Dowling secretary of the concern.

The Fall River Electric Light Co., of which Roy F. Whitney is president, J. E. Osborn vice president and Andrew P. Nichols treasurer, has capital of $5,300,000, employs 175 hands, and is a big factor in providing power, light and heat to many of the local mills.

The Mechanics Foundry & Machine Co., capitalized for $30,000, employs fifty mechanics in producing iron castings. Arthur S. Phillips is president and Ernest Hilton, treasurer.

The City Brass Foundry, a partnership which includes Horace W. Ellis and William E. Moore, also produces castings.

The Borden & Remington Co., capitalized for $50,000, employs 100 hands in the manufacture of chemicals, dyes, and starches, Albert A. Harrison being president and William F. Davis secretary and treasurer of the corporation.

William Prosser & Son employs fifty operatives in the production of builders finish, the concern being capitalized for $150,000. William A. Prosser is president, Wentworth Durfee vice president, William A. Prosser, Jr., treasurer, and Albert Moss, secretary.

Ernest Scott & Co., owned by H. Austin, employs fifty hands in the manufacture of chemical process machinery.

The Textile Paper Tube Co., of which Robert D. Douglas is president

and Garret D. Douglas vice president, employs forty hands, in producing paper tubes.

Isaac Varney & Sons Co. manufacture boxes, Edward B. Varney being president and William D. Keefe treasurer of the company.

O. B. Wetherell & Son Co., with capital of $90,000, manufactures roller covering and employs 100 hands. E. C. Merrill is president and Howard B. Wetherell treasurer.

F. L. Hervey & Co., employs seventy-five hands in the manufacture of leather belting and operates a branch unit in New Bedford. John P. Smith is president and treasurer.

The J. Desjardins Briar Pipe Co., with capital of $150,000, employs twenty-five men in the manufacture of briar pipes and smokers' articles, Joseph R. Desjardins being president and treasurer, Philip J. Desjardins, secretary, and Francis G. Allen, clerk.

The Dexter Lumber Co. employs thirty men in the production of builders finish. Henry A. Dexter is president and Archibald McDougal treasurer of this corporation, which has a capital of $45,000.

The Textile Belting & Strapping Co., owned by Leonard S. Chace produces leather belting and strapping.

The Waycross Company, with capital of $200,000, manufactures automobile windshield cleaners. J. E. Demers is president, David Bilsky vice president and Joseph F. Delehanty treasurer and secretary.

The Sterling Ring Traveler Co., with capital of $129,000, employs twenty-five operatives in the manufacture of ring travelers. Bernard W. Trafford is president and Walter J. Wixon treasurer.

Brewer & Co., of Worcester, operate a Fall River branch in the preparation of pharmaceuticals and wool oils; the Butchers Rendering Co., a subsidiary of the Consolidated Rendering Co., of Boston, manufactures tallow; the National Biscuit Co. operates a local plant and the Turner Center System, of Boston, maintains a Fall River unit.

MODERN POLICIES IN STYLING ARE IN VOGUE IN FALL RIVER

While inventive genius as exemplified by patents and processes developed in Massachusetts has revolutionized practically every industry in the country, in no respect has the accuracy, quality and inventive capacity of this section been demonstrated to a greater degree than in the production of textiles.

Fall River mills not only have adapted themselves speedily to the vogue for silk and its substitutes, but they have been the leaders in adapting textile production generally to the new demands of consumers.

If the development of rayon in America had been left to mills outside of Massachusetts it would not now be as far ahead as it is, for the perfectly obvious reason that Massachusetts manufacturers in adding rayon to the equipment in their textile mills did a very large part of the pioneer work that had to be performed by somebody in order to make the fibre economically workable and commercially profitable in fabrics that enter the world market in volume yardage.

Long before the war, and for some time thereafter, plants like the Stevens Mfg. Co., of Fall River, and the Monument Mills, of Housatonic, turned out a very high grade of all-cotton bedspreads, and today these concerns are running full time, producing rayon-and-cotton mixtures almost exclusively for bedspread and home decoration purposes, and leading the country both in style and serviceability of product.

SOME RECENT ACCESSIONS

In 1929 the Fall River Industrial Buildings, Inc., was organized by a group of local business men for the purpose of acquiring through purchase some of the best in the idle manufacturing plants, and of offering them for lease or purchase at such figures as would encourage the advent of new industries. Shortly after the corporation was created the Velveray Corporation of America leased a part of Iron Works Mill No. 7, owned by the American Printing Co., and installed machinery for the printing of silks and rayon.

The Louis Grossman Co., leased part of the No. 1 Durpee Mill and began the manufacture of women's and children's dresses, while the Leo M. Cooper Co., leased another section of the Durfee plant and began the production of nurses' uniforms. The officers of the Cooper concern also announced their intention of removing the machinery in its Bridgeport, Conn., factory to Fall River.

The Greenleaf Manufacturing Co., which already had established a plant in the city leased a second factory and added the production of pajamas to its line.

The Sally Middy Company of New York, of which Robert L. Schwartz is president, leased the entire first floor of the Durfee Mills, containing approximately 30,000 square feet, and began the manufacture of middy blouses and women's dresses. The officers announced that when all the machinery was installed it would employ 1,000 operatives. The other three accessions are now utilizing the services of 500 hands in the aggregate.

Up to November 1, 1929, twenty-eight new industries had begun business in Fall River in the calendar years of 1927, 1928 and 1929. highest shown since 1923.

THE PRESENT IMPORTANCE OF FALL RIVER

Despite the migrations of textile units to the South, Fall River ranked fifth in industrial importance, in the Commonwealth, measured by product value, in 1927, being preceded only by Boston, Worcester, Cambridge and Lawrence.

Numerically, but forty-one out of Fall River's 251 industries are strictly cotton goods concerns, although seven others are engaged in cotton small wares production, but $86,577,882 of the total invested capital of $133,760,345, in the city, is devoted to cotton goods production, and $1,269,468 to cotton small wares. In 1927, the total value of all products manufactured in Fall River's 251 factories was $127,011,293, while the value of stock and materials used was $77,401,906. There were employed 31,364 wage earners, who were paid $29,217,619.

In the city's principal industry, cotton production, the value of these manufactured commodities—$66,745,107, constituted 52.6 per cent of the total production, and gave employment to 25,561 men and women, or 81.5 per cent of the total wage earners engaged in the manufacturing industries of the city.

Although the percentage of increase in the average number of wage earners over 1926 was only fractional, nevertheless, the actual number of wage earners employed in this, the chief industry of Fall River, was the highest shown since 1923.

CHAPTER XII

NEW BEDFORD

THE WORLD CENTER OF FINE TEXTILES

New Bedford had its industrial birth at a time when what is now denominated as the wheat belt was still carried in the school geographies as the "Great American Desert," and at a period when little of the hidden wealth of the farm land of Iowa had been broken by the plow.

Nobody could then foresee that in less than two generations hence the retired sons of the middle western farmers would loll in the sunshine of Pasadena, or disport themselves on the sands of Palm Beach, during the winter seasons.

The genesis of the world's greatest fine cotton goods center was coincident with the discovery of new economic resources, the introduction of new processes, the creation of new industries, and the harnessing of new forces whose ultimate objective was then hidden from mortal eye.

Steel, oil and transportation were but in their infancy, and even the wisest heads could not visualize the influence they were to exert in rebuilding the nation.

Not even the wildest imagination conjured up the day when twenty-four million motor cars, thousands of airplanes, countless miles of wire, and queer radio contraptions purloining the waves of the air, would conspire to annihilate time and space.

New Bedford displayed only ordinary interest in the textile development transpiring in the neighboring Bristol County city of Fall River, until the latter municipality was humming with approximately 100,000 spindles, that had been installed in her factories, up to the middle of the last century.

Her capital and her citizens were too deeply engrossed in the harvests of the seven seas, resulting from New Bedford's whaling industry, to think of planting their profits in brick, mortar, spindles and looms, on the terrain of what at that period was internationally known as "The Whaling City."

But influences were at work whose portents were plainly discernible to those who were peering into the future. The heyday of whaling was passing. The knell of the industry had sounded. The fabulous profits of the earlier times were rapidly dwindling. Fall River was growing apace under the stimulus of its cotton manufacturing concerns.

New Bedford was standing still. Into what industry should her capitalists turn the capital amassed in their whaling adventures? Cotton seemed to be the logical answer, and singularly enough, at the beginning the entrepreneurs of The Whaling City poured their capital into concerns designed and equipped to produce fine goods, in contradistinction to the coarse types of cotton production which had been inaugurated in Fall River.

Chief Wesamequin and his son, Wamsutta, never dreamed when, in 1652, they parted with the title to what, in Indian language, was called Acushnet, but which we of the twentieth century know as New Bedford,

that they were deeding the land upon which two centuries later would be built the foundations of America's greatest production center of fine cotton textiles. Geographically the best located port on the North Atlantic coast, only eighteen miles from the track of all ocean coastwise commerce passing outside of Cape Cod, and but seven miles from the line of all vessels using the Canal,—the gateway to Cape Cod itself—and the port of sailing to the famous islands of Martha's Vineyard and Nantucket, the New Bedford harbor has a channel 300 feet wide to the wharves, with twenty-five feet of water at low tide. Among its attributes is the pretentious state pier 700 feet in length, with twenty-five feet draught along the sides and end, and with unexcelled railroad trackage and connections as well as ample undercover loading platforms and immense storage space.

Its lines of service include daily overnight steamship freight accommodations to New York; daily passenger or freight steamship service to Martha's Vineyard and Nantucket; overnight steamship passenger vessels to New York during the summer months, and excellent railroad passenger and freight service to all points.

The city has five modern public warehouses, which are an important adjunct to its industries. Collectively these structures have a capacity of 12,400,000 cubic feet, and a cotton storage capacity of 300,000 bales.

Because New Bedford is the leading city in the manufacture of fine cotton goods and has such ideal storage facilities, it has become the spot cotton market of the north.

THE NEW BEDFORD CORDAGE COMPANY

When the textile industry of New Bedford is alluded to, most people think of the cotton mills and the city's reputation as a textile manufacturing center is generally considered in terms of cotton goods of one type or another.

But there still exists a textile manufacturing establishment in the city which antedates the oldest of the local cotton mills, and which, in its peculiar field, has upheld for almost ninety years the traditions of the fine-goods mills as a maker of high quality products.

In 1842, Joseph Ricketson, and William J., and Benjamin S. Rotch, headed a group of local ship owners and captains of vessels in New Bedford, then the center of the whaling industry, and formed an enterprise, known as the New Bedford Cordage Company, to make rope for use on their own vessels. On February 2, 1846, a change was made from the partnership to the corporate form of existence, with capital of $60,000, "for the purpose of manufacturing cordage in the town of New Bedford," as stated in its charter. There remain as stockholders of the corporation, descendants of the officers who were elected at the first meeting of the concern, on April 2, 1846, and the mill still occupies its original site—"up on the hill"—the connecting link between the whaling days and the more modern era of textile manufactures.

The cordage company by no means, however, represented the first attempt to manufacture rope in New Bedford, for the whaling industry, in the period antedating the Civil War, naturally attracted rope makers and there were a number of small rope-making establishments in the town, catering to the needs of the whale ships. They employed, however, the old fashioned hand method and became so adept in the production of cordage possessed of great stoutness that it became traditional in the local whaling industry that the "tub-line"—that slender thread by which the whale-boat

hung fast to its quarry after the strike was made,—simply had to be a New Bedford-made rope.

Few whalers, even today, will put to sea with anything but New Bedford "tub lines," no matter what other kind of cordage may be used in the rigging or other equipment of the vessel.

Demand for New Bedford-made "tub lines" probably served to a large degree as the basis for the original organization of the New Bedford Cordage Company, which is the only local rope making concern to outlast the passing of the city's whaling industry. Here again it seems to be another case of "the survival of the fittest." The company's ability to keep step with modern progress and to serve other lines of business with the same top-notch quality of cordage that made New Bedford "tub lines" known throughout the world as the acme of excellence and dependability, furnishes the answer.

Three years after incorporation, the company increased its capital to $75,000. The plant was built on what, at that period, were the western outskirts of the city, and its chief unit was the long rope-walk—

"In that building long and low,
With its windows all a-row,"

which served as the inspiration for Henry Wadsworth Longfellow's poem.

It stands today in the same location, at the corner of Ash and Court streets, occupying an area of four acres or more. The buildings have been greatly modernized and enlarged since whaling days, but the long rope-walk remains in appearance the same, almost as it was nearly ninety years ago, except for the use of mechanical instead of hand power to turn the twisting wheel.

The pungent, but not unpleasant, odor of tar clings to the neighborhood as it did in by-gone days, but there is now the hum of many wheels, the rhythm and rattle of machinery and the noise of shuffling feet,—all typical of the speeding-up of manufacture and of life itself—which is so characteristic of the machine age.

The company is not now dependent solely upon the rope-walk with its laying and its forming ground, for today there are machines that twist the strands and form the rope,—an almost endless one if desired—without requiring any such long unbroken stretch of land or buildings as the old-fashioned rope-walk. In the olden days, the length of the walk determined the limit of any single coil of cordage that could be made on it. The rope-making machines of this decade have no such restriction, being limited only by the size of the rope and of the drums on which it is wound, as to the length that can be made in one piece. The rope-walk has by no means lost its usefulness, however, for with its more modern mechanical twisting equipment it can turn out certain sizes of cordage economically.

One of the latest improvements made was the complete electrification of the plant, by the installation of 42 motor units, each of which drives a certain group of machinery.

The financial history of the company up to 1905 included many reorganizations, and periods of adversity and prosperity, but since that year, when the capital structure was revamped and the management placed in the hands of Francis A. Bryant as president and general manager, the dividend disbursements have been highly satisfactory. W. Wallace Totten is vice president, Charles Weed, treasurer, and Martin Walter, Jr., superintendent. Two hundred and fifty hands are employed, and the corporation has capital of $700,000.

THE WAMSUTTA MILLS

As we study the record of the past how frequently we note the influence of an event, which, at the moment appears to be insignificant, but one which often exercises a profound influence upon the immediate and remote future.

When a hole was bored into the ground at Titusville, Pennsylvania, out of which poured the first petroleum discovered on the American continent, enabling oil in its crude state to be profitably marketed for a dollar a barrel, that little aperture in the terrain of the Keystone state spelled the end of New Bedford's whale fisheries. Crude sperm oil could not be profitably sold for less than $1.25 per gallon.

Indicative of the intuition of some of her far-seeing citizens, who long had been apprehensive that the industries of the town ought to be more diversified, and not confined exclusively to the building and equipment of whaling vessels, a group of New Bedford men, headed by Joseph Grinnell and Thomas Bennett, Jr., both natives of the town, organized the Wamsutta Mills,—the city's first fine cotton goods industry,—on April 8, 1846, and then and there was sown the seed which, in full fruition, was to develop into the largest fine cotton goods manufacturing city in all the world. The three incorporators whose names appear on the company's charter, were Matthew Luce, Jireh Perry and Thomas Hathaway.

Thus textile production had its inception in New Bedford even before the whaling industry had really passed the zenith of its prosperity. This turning away from the sea to manufacturing enterprises blazed the path for others to follow when the future calamity of serious importance which many had predicted came to pass with the rapid development of the petroleum industry.

By the time the whale fishery was destroyed the Wamsutta Mills had become firmly established in the industrial life of the city and nation.

In his early manhood, Joseph Grinnell left New Bedford, and engaged in business in New York, which proved profitable, and, in a few years, possessed of an ample fortune, he returned to his native heath to devote himself to the upbuilding of the community, and soon became the foremost citizen of the town, projecting, in 1840, the New Bedford & Taunton Railroad Co., of which he was the first president.

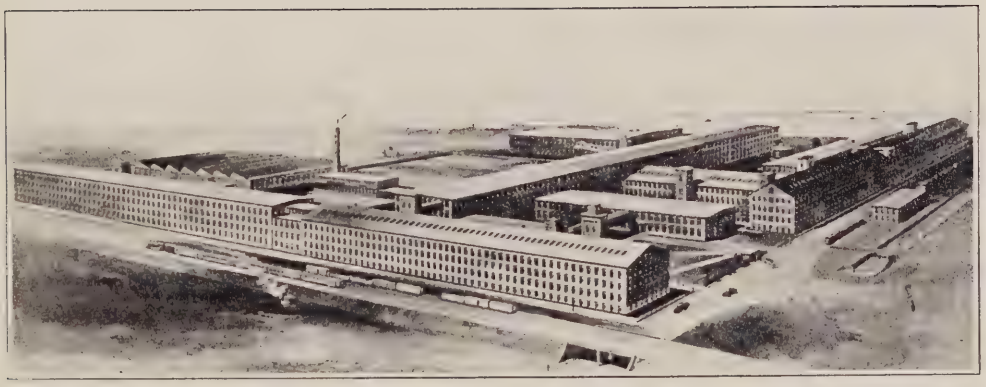
During the forties, Dwight Perry, of Fairhaven, owned a small cotton mill in the South. One of his employees, Thomas Bennett, Jr., was ambitious to operate a plant of his own.

Returning to New Bedford to raise the necessary funds, he appealed to Mr. Grinnell, then a member of Congress, for aid and influence. At first, the latter believed that Bennett's idea of locating the enterprise in the South was correct, but the longer he considered the proposition the more he became convinced that New Bedford was an advantageous locality in which to establish the venture, and he finally insisted that if Bennett expected his financial support and coöperation it must be located in The Whaling City.

The importance of this decision can scarcely be overestimated as we look at the situation today. There seems to be little doubt that had this initial venture in the field of fine cotton production been planted south of the Mason & Dixon line, the industry would have become firmly rooted there, and instead of attracting to New Bedford and Bristol County the hordes of workers who subsequently came to this country from foreign climes to apply their skill, transmitted to them through generations of



WAMSUTTA MILLS, NEW BEDFORD, 1847



WAMSUTTA MILLS, NEW BEDFORD, 1923

forbears who had worked in the long-established textile plants of the old world, they would have gravitated to the South.

One cannot wonder had the original decision been adhered to whether it would have resulted in the development, in Georgia, of the fine-cotton manufacturing business of America instead of at New Bedford where it began and where the city still enjoys the reputation of being the greatest fine-goods textile center in this country.

Considerable difficulty was experienced in securing subscriptions to the original capital stock of $100,000, subsequently increased to $160,000, few individuals taking more than ten shares, while the largest single block was 150 shares. Mr. Grinnell was chosen president and Mr. Bennett, superintendent, and under their management the plant grew to include four mills, the first unit, a five-story stone structure, being commenced in 1847.

Some of the promoters thought that inasmuch as Fall River, at an earlier date, had engaged in cotton production, New Bedford might learn much by her experience, but Messrs. Grinnell and Bennett declared that the Wamsutta project should not be classed as a print-cloth mill, nor should it engage in manufacturing the coarser fabrics, but, on the contrary, it must be a first-class fine goods mill, and for more than three-quarters of a century this policy has been maintained. Mr. Bennett and David Whitman, of Rhode Island, the latter a celebrated mill engineer, who was called in as an adviser, recommended the manufacture of the standard shirtings which ultimately established the reputation of the mills. The original equipment consisted of 10,000 spindles, and 200 looms, and the first cloth was turned out on New Year's Day, of 1849. The stockholders had designed Old Mill No. 1 for 15,000 spindles, and 300 looms, but lack of capital, caused a 33⅓ per cent shrinkage over what they had counted upon.

It is, therefore, obvious that when New Bedford began its climb to fame as the ultimate center of the fine cotton textile production of the nation the local capitalists experienced as much financial difficulty in launching the Wamsutta Mills as the industrial executives of today are meeting in the unsettled conditions now prevailing, in both the fine and coarse goods units.

All of the original employees were secured in Rhode Island, Connecticut, and from towns in Massachusetts, other than New Bedford, as there were few if any residents of the latter place who were versed in cotton manufacturing operations.

In 1854, the second Wamsutta unit was built, adjoining the original mill, and the capital was increased to $600,000.

In 1860-61 a duplicate of the second mill was erected, and the capital was increased to $1,000,000, but this unit was not used until 1865 on account of the Civil War settlement. These three buildings housed 47,000 spindles.

In 1870 the fourth mill, a brick structure, was added, which almost doubled the productive capacity of the plant, and in 1875, the fifth unit was erected, followed in 1881-82 by the sixth, and in 1893, by the seventh, and at that period 230,000 spindles, and 4,450 looms were in service, and 2,100 hands were employed. The capital had reached $3,000,000 at that time.

The Indian name, "Wamsutta," meaning Loving Heart, was appropriately chosen to describe the plant in memory of the great sachem, Wamsutta, whose firm integrity, honesty of purpose and steadfast character have been incorporated into the policy of the Wamsutta Mills.

A development, which linked Wamsutta with a prominent rayon pro-

ducer, materialized about four years ago when an agreement was reached by the New Bedford corporation with the Industrial Fibre Corporation, of Cleveland, Ohio, whereby Wamsutta became the New England agent for the industrial rayon process and it converts this fiber in one of its own buildings, and uses it in the goods it manufactures.

This marked another step in the diversification of a plant which now manufactures a variety of finished fabrics. Wamsutta products include not only sheets and pillow cases, but oxfords, lawns, fancies, poplins, yacht ducks and high grade fine weaving and knitting yarns.

The arrangement was of interest also because it marked an interesting type of coöperation between a rayon producer and a rayon consumer. The use of one of the buildings of the Wamsutta Mills in the conversion of industrial rayon meant that this plant was able to supply to the trade the fiber on cops, cones, beams or warps, either bleached or dyed. It also meant the discontinuance of the Paterson, N. J., throwing and dyeing plant belonging to the Ohio concern.

Not so long ago American yachts designed by American marine experts, built by American craftsmen and sailed by American navigators were forced to race under sails of imported or foreign-made duck, because no American-made yacht duck was available.

This situation coming to the attention of Treasurer Broughton of the Wamsutta Mills, was promptly remedied. He caused specially built looms to be installed in the plant, and although eight months were required to produce them, the first bolt of the new fabric was turned out March 12, 1923, and this six-ounce Egyptian sail duck was delivered by special car to the Herreshoff Mfg. Co., at Bristol, R. I., for use on the yacht, *Wildfire*. Tested by Dr. Millard, of the Massachusetts Institute of Technology, in comparison with foreign-made fabrics, the results as to strength and resistance to stretch, under all conditions, showed the Wamsutta product to be superior to the foreign fabric. While but four weights were manufactured at the outset, the demands of yachting have so increased during the past six years that Wamsutta now is producing fifty different fabrics for the yacht sail-makers, and the list of winning skippers, who give credit to the driving power of Wamsutta sails, is long and representative.

Here again is an instance where a Massachusetts manufacturer observed a need and proceeded to fill it.

Today, Wamsutta Mills have a capital of $6,000,000, and operate nine mills, which are equipped with 111,808 ring, 83,420 mule and 8,952 twister spindles, a total of 204,180, 520 broad and 2,777 narrow looms, 494 cards, 87 cotton combs, 72 sewing machines, and 7 boilers, and employ 2,200 operatives. Oliver Prescott is president, Charles F. Broughton, treasurer, W. F. Staples assistant treasurer, and W. O. Buzzell agent.

THE NEW BEDFORD GAS & EDISON LIGHT CO.

The unobtrusive service which makes possible instant heat by the turning of a jet or renders a flood of illumination by the pressing of a button has become so commonplace in our everyday lives that it is accepted without a thought of the intricate organization, both human and mechanical, that lies behind the gas pipe and the electric wire.

The fascinating story of the inception and growth of the New Bedford Gas & Edison Light Co. stretches back to 1850, when a small concern, with equipment that would now be regarded as crude and primitive, engaged in manufacturing gas for the use of the whaling captains and merchants of old-time New Bedford. The New Bedford Gas Co. received its

charter that year and thirty-four years later it absorbed the New Bedford Arc Light Co., which was then conducting a small business. In 1890, the Edison Electric Illuminating Co., of New Bedford entered the field, and joined with the gas unit in forming what today is known as the New Bedford Gas & Edison Light Co.

At that period, there was in existence the New Bedford Electric Light Co., which supplied its clientele on a contract basis, irrespective of the quantity of electricity used, and consumers were profligate in keeping lights on all night because it cost no more under their contracts for 24-hour service than it did if they burned the current only an hour. The Edison Co. introduced the metered service, steadfastly refused to alter its business-like methods and it was rewarded eventually by obtaining most of the customers of the other company, and finally took it over. George R. Stetson was the first president, and Charles R. Price the first treasurer, of the New Bedford Gas & Edison Light Co.

The merger of the New Bedford Electric Light Co., with the Edison unit, brought forth protests from some of the merchants and there was formed the People's Non-Explosive Sanitary Gas Co., which, in 1894, was succeeded by The People's Gas Co., a corporation organized to develop the plans of Gen. Eugene Beauharnais, an inventor who claimed to have discovered a method whereby he could produce gas from potato parings and other decaying vegetable matter. An experimental plant and office were established on the Old Taber Wharf, but the venture was soon abandoned.

The New Bedford Gas Co. first produced its gas from coal, next water gas apparatus was employed, and, in 1924, the manufacture of its gas from oil was begun. It has a possible maximum output of 6,000,000 cubic feet of water gas and 4,000,000 cubic feet of oil gas, and maintains two storage gas holders, one of 1,000,000 cubic feet capacity, and the other of 1,500,000 cubic feet.

In 1910 it carried 200 employees on its payroll; today it has 600. In 1914 the attractive office building, on Purchase Street, was erected. In 1910 the company had 14,481 gas meters in use; in 1927, it had installed 34,389 meters and the output of the former year—363,000,000 cubic feet —had grown in the latter year to 949,264,000 cubic feet.

The company serves not only New Bedford with gas and electricity, but gas is furnished to Fairhaven, Acushnet, Smith Mills, and Padanaram, while the electric service goes to Mattapoisett, Fairhaven, Acushnet, Lakeville, Freetown, Assonet, Dartmouth and Westport, with a high tension line running to Marion and Wareham, over which is handled the current supplying Cape Cod, as far as Chatham and northerly to Plymouth, Duxbury, Marshfield and Middleboro.

In 1910 the company had installed 2,403 electric meters and the output that year was 2,681,000 kilowatt hours. In 1927, there were 40,085 meters installed and the company had an output of 155,441,314 kilowatt hours. In 1910 the company had 290 miles of wire and cables in use; in 1925, the total was 2,397 miles.

In 1916 the present huge electric station was started, but it was not completed until 1922 and ranks as the third largest in New England, being equipped with 16 boilers, each with a capacity of 600 horse power; eight with 755 horse power each, and four with a capacity of 1,608 horse power. There is storage space for 40,000 tons of coal, belt conveyors and a traveling crane expediting unloading, while two diggers constitute a part of the equipment. There is a depth of 25 feet at the company's dock and the coal

unloading capacity of the plant ranges from 800 to 900 tons directly from a barge in a ten-hour period.

Upon the death of President Stetson, in 1912, he was succeeded by Oliver Prescott, who still holds the office.

The concern is one of the best managed public utility units in the country, its record of producing a kilowatt hour of electricity on 1.53 pounds of coal, which is its average cost, being an outstanding accomplishment, the general average being two pounds.

Mr. Price still holds the responsible position of treasurer, and Frank H. Gifford is vice president, of the corporation which has capital of $5,342,400.

In 1856 the Hill & Cutler Co., was established to deal in cotton waste. Today, the concern is capitalized for $300,000, maintains a branch at Lowell, a Boston office at 176 Federal Street, and employs 100 operatives. Laurance D. Chapman is president and treasurer, William H. White, vice president, and M. L. Allen, assistant treasurer.

THE MORSE TWIST DRILL & MACHINE CO.

One of the outstanding factors in the industrial development of the last half century is the manner in which machinery and tools have been adapted to practically every industrial use.



FIRST FACTORY OF THE MORSE TWIST DRILL & MACHINE COMPANY, NEW BEDFORD

During this comparatively short space of time, not only has machinery been produced for many purposes, where handwork was formerly the only means of operation, but so many and so varied have been the improvements made on the machines, and on the tools designed for use in connection with them, that today it is often difficult to recognize even a trace of the original models in those in present day use.

Probably there is no line of production so well provided for in this respect, or in which progress has been so rapidly made by some of the great engineering concerns, as that applying to the use of machinery and machinists' tools. Today, there are few operations connected with the handling and working of metals, from the stage of the raw materials to the most delicate and sensitive scientific instrument manufacture, that are lacking their special machinery, and among the names which stand out all over the world as representing this vast advancement that of the Morse Twist Drill & Machine Co., whose products for sixty-five years have con-

stantly shown improvements in design and construction which, in many instances, have revolutionized the application and usefulness of metal-working machinery, is near the head of the list.

From a modest little two and one-half story shop, erected in 1864, the plant has gradually developed until today it covers two city blocks, the buildings containing 230,143 square feet of manufacturing space, equipped with the latest type of modern equipment, and when operating under normal conditions the concern employs 1,000 workers.

Founded in 1861, with original capital of $30,000, furnished by a group of New Bedford men, the company now has capital of $2,000,000 plus a net surplus of quick assets in excess of a million, all of which has been built up from the re-investment of its earnings. More than 20,000 sizes and styles of tools are produced today in what originally was but an obscure machine shop.

Efficiency and quality have been responsible for this metamorphosis and today the company takes rank as one of New Bedford's chief industries. In a special laboratory, connected with the plant, all raw material is subjected to test, and the Morse unit is but one of many Massachusetts concerns that has kept pace with the rise of new industries in which revolutionary changes of methods required the rapid advancement of machine tools toward perfection and greater efficiency. From the towering sky-scraper down to the subway, on to the automobile and treking its way through a maze of intricate machinery even to the twentieth century wrist watch, one traces the work of the drill, without which it would be well nigh impossible to produce many present-day marvels. Aeroplane engines, racing automobiles and all high speed internal combustion motors must be drilled to an accuracy undreamed of even in the early days of Henry Ford, and perhaps no American concern has contributed more to bring about synchronized action through holes than the Morse Twist Drill & Machine Co.

Edward T. Pierce is president, William T. Read, vice president and treasurer, and Irving W. Cook, clerk of the corporation.

THE PAIRPOINT MFG. CORPORATION

In 1880, the Pairpoint Manufacturing Corporation was incorporated with $100,000 capital, Edward D. Mandell becoming president, Alexander H. Seabury, treasurer, and T. J. Pairpoint, secretary and agent. Successful from the start, the capital was soon increased to $400,000 and large plant additions were made. On June 1, 1894 the corporation absorbed the Mt. Washington Glass Co., the second oldest establishment of its kind in the country, and at that time producing the finest grade of blown, decorated, cut and engraved glass.

The capital of the Pairpoint concern was increased to $750,000 that year and on September 1, 1896 it was fixed at $1,000,000, later being reduced to $900,000. With a plant covering 500,000 square feet of manufacturing space the concern has become one of New Bedford's leading industrial units, and holds a unique position locally in that in the midst of scores of fine cotton textile plants this corporation produces in addition to its original line of silver plated ware, long recognized as being of the highest quality, paper for use in its paper products department for making cones, tubes, etc., for textile uses; paper board for making paper boxes; metal electroliers with hand decorated shades, and the highest grade of cut and engraved and fine colored glassware.

Its goods are found in the finest and most exclusive stores in the United

States, and The Pairpoint Corporation has the distinction of being the only large remaining glass manufacturer in New England.

The corporation maintains show rooms in New York, Montreal, San Francisco, and New Bedford, and employs a force of twelve traveling representatives. Upwards of 1,000 employees are carried on the payroll.

In 1885 Thomas A. Tripp was elected treasurer and general manager, and in 1900 Andrew G. Pierce, Jr., was chosen president, Clarence A. Cook, treasurer, and Thomas A. Tripp general manager. These officers continued until 1919, when, on the death of Mr. Cook, Thomas A. Tripp was elected vice president, William A. Clarke, treasurer, and Frederick R. Fish, general manager.

The present officers are Frederick R. Fish, president and general manager, Thomas A. Tripp, vice president, and William A. Clarke, treasurer.

THE POTOMSKA MILLS CORPORATION

It was the remarkable success of Wamsutta, which, between February, 1850, and April 1, 1874, paid 50 dividends, aggregating 301 per cent that turned the attention of local capital to fine cotton goods enterprises. In 1871, Mill No. 1, of the Potomska Mills Corporation, which was organized with $600,000 capital, was built. Six years later, a second unit was added, and the corporation increased its capital to $1,200,000, operating at that period with 108,000 spindles, 2,700 looms and 1,300 hands.

Today, Potomska operates three mills, has capital of $1,800,000 and employs 1,200 operatives in the production of plain and fancy cotton fabrics, including India linens and lawns. The plant is equipped with 66,740 ring, 37,560 mule, and 10,436 twist spindles, a total of 114,736, 2,908 looms, 198 cards, and 17 boilers.

John Duff is president, Charles E. Brady, treasurer, and James B. Sullivan, superintendent.

THE ACUSHNET MILL CORPORATION

What may be described as the new era of cotton manufacturing in New Bedford, began in November, 1881, when the Acushnet Mill Corporation was founded, its first president being Horatio Hathaway, and its first treasurer, Joseph F. Knowles. The former served until 1898 when illness forced his resignation. He was succeeded by William W. Crapo, and the latter by Thomas H. Hathaway, who, in turn, was followed by his brother, Horatio Hathaway, now president of the corporation.

Mr. Knowles died in 1909 and was succeeded by James E. Stanton, who resigned in 1924, and Robert A. Bartlett was chosen treasurer, which position he now holds.

The corporation has capital of $1,600,000, all common stock, and manufactures twills, sateens, curtain marquisettes, shirtings, plain goods and fancy weaves of all descriptions, suitable for the cutting up trade, and silk and rayon mixtures. In the corporation's three mills, 3,527 looms, 102,376 spindles and 12 boilers are installed and the company employs 1,450 operatives. The Acushnet unit is the fourth oldest cotton manufacturing industry, in New Bedford.

The Oneko Woolen Mills, with capital of $210,000, were organized in 1881.

THE GRINNELL AND CITY MANUFACTURING CORPORATIONS

In 1882, the Grinnell Mfg. Corporation was established, and today has capital of $1,500,000. The three mills comprising the plant are equipped

with 119,216 spindles, of which total 54,096 are ring, 62,420 mule, and 2,700 twist spindles, 3,135 narrow looms, and 20 boilers. Nine hundred hands are employed in producing fine cotton goods, and plain, fancy and silk mixtures.

Andrew G. Pierce is president, Joseph W. Webster, secretary and treasurer, and George Snedden, superintendent.

In 1883, the New Bedford Manufacturing Co. was organized by William D. Howland, and a group of associates to engage in the manufacture of yarns exclusively. Later the concern became the New England Specialty Co.

The City Manufacturing Corporation was incorporated in April, 1888, the first board of directors being made up of Cyrenius W. Haskins, Thomas H. Knowles, Edward Kilburn, John P. Knowles, Jr., Otis N. Pierce, Rufus A. Soule, and Thomas B. Wilcox all of New Bedford, and Stephen A. Jenks, of Pawtucket, R. I., William H. Parker, of Lowell, and Charles Tucker of South Dartmouth. Otis N. Pierce was chosen as the first president, and Benjamin Wilcox as the first treasurer.

The initial installation consisted of 20,000 spindles, and today there are 59,064 ring, and 16,736 twister spindles, and ten boilers, while 260,000 square feet of manufacturing space are utilized in the New Bedford plant, and in the branch unit, in Taunton, 70,000 additional feet are employed. Nothing but weaving is carried on in the latter plant, where 600 looms are operated by the corporation. Carded and combed yarns constitute the company's products, at New Bedford.

Dividends paid through 1928 totalled $330.75 per share, an average for thirty years of a little over $11.00 per share of $100, per year.

James E. Stanton, Jr., is president, John B. Strongman, treasurer and clerk. The present board of directors is made up of: George N. Alden, J. E. Stanton, Jr., William O. Devoll, J. B. Strongman, Henry S. Knowles and Frederic Taber. The corporation has capital of $375,000 and employs 650 operatives.

THE HATHAWAY AND BRISTOL MFG. CORPORATIONS

The Hathaway Manufacturing Corporation was incorporated December 22, 1888, with capital of $400,000, which was increased to $800,000 five years later. Today it employs 1,300 operatives in producing specialties and novelties in plain and jacquard fabrics in silk, celanese, rayon, cotton and mixtures.

The two mills comprising the plant are equipped with 3,374 looms, 70,336 ring and 36,980 mule spindles, a total of 107,316, and the corporation has capital of $1,600,000. Horatio Hathaway is president, James E. Stanton, Jr., treasurer, and John Robinson, superintendent.

The Howland Mills Corporation was established the same year, and the Bennett Mfg. Co. was formed in February, 1889, with capital of $700,000.

The Bristol Mfg. Corporation was incorporated in 1892, and manufactures plain and fancy fine combed cotton goods. The plant is equipped with 50,000 ring and 17,240 mule spindles, 1,888 looms, and 10 boilers, and the company employs 700 operatives, and has capital of $1,000,000.

Frank S. Wilcox is president, Charles A. Morrison, treasurer, Frank Neild, general manager, and Samuel Taylor, superintendent.

The Columbia Specialty Co. was also organized in 1892, with capital of $750,000 to manufacture hosiery yarns.

THE PIERCE MFG. CORPORATION, AND THE WHITMAN MILLS

On March 21, 1892, the Pierce Mfg. Corporation was incorporated, and today produces fancy and fine cotton and silk goods, and aircraft fabrics. The company has capital of $600,000, and employs 1,000 operatives. The plant is equipped with 3,450 looms, 116,000 ring and twist spindles, and 10 boilers.

This corporation has shown an average yearly return to shareholders over the period of the past 25 years of $24.76 per share. Since 1911 the company has increased its surplus by $1,688,846, the surplus account, including depreciation, standing at $2,263,799, in 1926. Its net quick assets are $2,041,196, and per share, $340, the capitalization per share on paid assets, excluding quick assets, being nil.

Edward T. Pierce is president, A. G. Pierce, Jr., treasurer and secretary, and A. R. Pierce, agent.

It was in 1895 that the Whitman Mills, now employing 2,000 operatives, in the manufacture of plain and fancy fabrics, cotton and silk goods, and single ply gray yarn for the market, were incorporated. The original capitalization was $1,500,000 and the initial installation consisted of 132,000 spindles, and 3,400 looms. The plant was materially enlarged, in 1902, and consists of two mills.

The mills of this concern are now equipped with 140,648 ring and 36,960 mule spindles, a total of 177,608, 22 boilers, and 4,610 looms.

C. L. Harding is president, Angier L. Goodwin, clerk, Albert G. Mason, treasurer and general manager, and Ernest Bromley, manufacturing agent. The corporation has capital of $3,000,000, at the present time.

THE DARTMOUTH MANUFACTURING CORPORATION

In 1895, James W. Allen and Abbott P. Smith organized the Dartmouth Manufacturing Corporation, for production of fine cotton goods, the concern being capitalized at the outset for $600,000.

At that time there were certain wise men in and out of New Bedford, who considered the experiment as a speculative proposition, and grave doubts were expressed as to whether the new corporation would pay dividends for many years to come. Naturally, the stock at $100 a share was accessible to any investor who had the courage to buy a block of it. Small lots were sold here and there, but many of the purchasers were skeptical and timorous, and some doubt was expressed as to the wisdom shown by the founders in choosing the new operative-superintendent.

In 1859 there was born, in a little village, near Bolton, England, Walter Hamer Langshaw, who came to this country at the age of six years, with his parents, who were then in humble circumstances. Four years later young Walter went to work as a bobbin boy in one of the mills, in Lawrence, and when his family moved to Manchester, N. H., three years later, he worked in the card room, and next in the office, of the Amoskeag Mills. Another removal of his parents,—this time to Rhode Island—found him employed in a cotton textile machinery plant, and later returning to Lawrence he again found employment in the mills there.

In 1894, at the age of thirty-five he married, and a few years later went back to Rhode Island to accept a position as overseer in one of the departments of the Manville Co., going from there to the Valley Falls Co., and thence to the Potomska Mfg. Corp. plant, in New Bedford, where he had charge of weaving and designing, and where he demonstrated his ability as a manufacturer and an executive.

Gathering together all of his savings, and borrowing from the banks, he became the owner of 100 shares of Dartmouth stock, and as superintendent of the new corporation, was placed in charge of the construction of the plant, at the time ground was broken.

The first mill was 821 by 100 feet, two and three stories in height, of brick, and contained 226,868 square feet of space, in which 27,000 ring and 33,000 mule spindles, and 1,400 looms, were installed.

Practically unknown, except as a skillful, all-round operative, with special executive ability, he impressed the management so favorably that three years later he was chosen one of the directors of the corporation.

In December, 1900, as agent and director, he proposed to build a new mill and double the capacity, but being opposed by the majority of the board, he was dismissed as agent, in June 1901, but two months later at the annual meeting a board of directors was chosen to succeed the members of the previous board who had opposed the policy, and Mr. Langshaw was reinstated, and at once plans were made for an additional mill, one of the new structures being a weave shed, 864 by 200 feet.

In assuming the position he took he was fighting to protect the one hundred shares—all that he had in the world—and to build for the future.

In 1906, he became the president of the corporation, and that year a two story brick building was completed in which an additional 1,000 looms were installed. By 1911, the plant consisted of four large manufacturing buildings and a five-story cotton house, and between 1906 and 1911 the spindlage increased from 60,000 to 200,000, and the loomage from 1,400 to 5,600.

The payment of quarterly dividends began in June, 1899, and has continued without interruption in the intervening 29 years, and up to the end of 1928, had amounted to $7,821,000, in cash, on the common stock, and $574,823.75 on the preferred, while two 100% stock dividends, were paid in 1909 and 1922, and one of 33⅓%, in 1913.

The corporation has capital of $3,600,000 common stock and $600,000 preferred, and employs 2,200 operatives in producing fine cotton and silk plain, fancy and jacquard fabrics, its special goods being declared to be equal to the high-grade products made in Europe.

This achievement has been accomplished by the use of the same kind of machinery, in the same field for labor, and in the same market for its commodities, as is enjoyed by other American fine-goods mills.

The success of the venture brought not only a great fortune to the ambitious bobbin boy of yesterday, but also to those who were fortunate enough to have placed their faith in him when he assumed control of the Dartmouth unit.

His own early training of comparative privation, and the spur of necessity under which his life work began, were responsible for his forming habits of industry and frugality, and in giving him an insight into the real problems of life, that he could not have secured in a university, nor as the scion of wealthy parents.

The pure joy of achievement, rather than the greed of accumulation, was the mainspring of Mr. Langshaw's industrial activities. Still active and possessing the vigor and courage that enabled him to bring the Dartmouth Mfg. Corporation from a minor to a commanding position in the industrial life of New Bedford his influence extends far beyond the gates of his own successful corporation. He occupies the position of president and agent, and C. W. Bartlett is clerk and treasurer.

In 1928 the corporation made an arrangement with Powdrell & Alex-

ander, Inc., to market certain cloths manufactured by the Dartmouth unit, and Mr. Langshaw became a director of Powdrell & Alexander, Inc.

In 1898 the Lambeth Rope Corporation was incorporated with capital of $90,000, to produce cotton banding, cordage, transmission rope, braids, spinning tapes, webbing and book bands, and employs fifty operatives. Harold W. O'Leary is president, A. L. O'Leary is treasurer, and J. E. Anderson, superintendent.

SOME OF THE TWENTIETH CENTURY TEXTILE ENTERPRISES

Perhaps one of the best answers to the constantly reiterated assertions that no new textile developments are occuring in Massachusetts is the fact that between 1900 and 1928 not less than 25 cotton textile plants, representing capital of upwards of $43,000,000, have come into existence in the city of New Bedford, equipped with approximately 2,000,000 spindles, and 24,000 looms.

Twelve of these started between 1901 and 1909 and the others, between 1910 and 1928.

In 1901, the Soule Mill was incorporated to produce poplins, pongees, broadcloths, sateens, silk mixtures, shirting, handkerchiefs, covert cloths, and novelties, and today the concern has capital of $1,260,000, employs 900 operatives, and the plant is equipped with 60,000 ring, 32,000 mule and 3,000 twist spindles, 2,300 looms, and 12 boilers. John Duff is president, Rufus A. Soule, Jr., treasurer, and Frederick H. McDevitt, agent.

In 1902, the Gosnold Mills Co. was incorporated, the plant being equipped with 133 cards, 2,608 looms, 77,000 ring spindles, and 6 boilers. Twelve hundred operatives are employed in the manufacture of fine cotton, and cotton and silk mixed goods.

C. L. Harding is president, Allen Barrows, treasurer, and C. E. Buckley, general superintendent. The corporation has capital of $3,300,000.

THE ASSOCIATED TEXTILE COMPANIES

The same year, the Butler Mill was incorporated, and produces fine lawns, organdies, sateens and fancies, employing 1,000 operatives.

Late in 1928 this corporation, the New Bedford Cotton Mills Corporation, which was incorporated in 1909, and the Hoosac Cotton Mills, of North Adams, were merged in the Associated Textile Companies, a Massachusetts trust, which was organized to acquire through exchange the common stocks in which the Butler family is largely interested.

The Butler Mill has 330 cards, 2,600 broad and 350 narrow looms, 116,000 ring, 39,000 mule, and 16,000 twist spindles, while the plant of the New Bedford Cotton Mills Corporation, was equipped with 100 forty-six inch, 900 forty inch, and 800 thirty-four inch looms, 160 cards, 45,000 ring, 28,000 mule, and 3,300 twister spindles, and the Hoosac Cotton Mills had 134 cards, 2,300 looms, 80,000 ring and 15,000 twist spindles, thus giving the consolidated concern 342,300 spindles, 7,050 looms, and 624 cards, making it the largest fine cotton goods unit in the industry.

The Butler Mill had capital of $2,300,000 common stock; the New Bedford Cotton Mills Corporation, $1,050,000 common and $750,000 preferred, and the Hoosac Cotton Mills, $600,000 common, and $750,000 preferred. A small unit owned by the Butler Mills is operated in Taunton.

It is purposed ultimately to unify the manufacturing and merchandising departments of the three mill corporations, in order to bring about unified operation and coöperation, and to increase facilities for distribution of the products as fully and promptly as circumstances admit. It is

anticipated that such unified operation will bring about economy in administration and general manufacturing and merchandising costs, and be reflected in the earnings of the mills and of the Associated Textile Companies.

Such capacity for varied production, ranging from plain fine goods such as lawns, voiles, broadcloths, organdies, silk and cotton, rayon and cotton, and all rayon goods, fancy shirting of the highest quality, curtain goods, draperies, and innumerable varieties of fine dobby and jacquard weaves, will, it is believed, in combination, offer the trade a unique service, not only in variety of product but in quality and quantity as well.

The trustees of the Associated Textile Companies are: Former United States Senator, Hon. William M. Butler, Frederick H. Prince, Winthrop M. Crane, Jr., Henry Hornblower, Thomas F. Glennon, Frank J. Hale and Morgan Butler.

The officers of the trust are: Hon. William M. Butler, president; Morgan Butler, vice president, Walter H. Underdown, treasurer, James F. Bacon, secretary.

The three companies employed at the time of the merger 3,200 operatives.

In the presidential campaign of 1924, when the Hon. Calvin Coolidge was nominated for the highest office within the gift of the people, he turned to an industrial executive of the city of New Bedford, for the chairman of the National Republican Committee, and for the man to manage his campaign for election. Hon. William M. Butler brought to the work a long and honorable experience in political activity, as he had served his home city as a State Senator, and as President of the Massachusetts State Senate, in 1894 and 1895. Subsequent to the Presidential campaign of 1924, Mr. Butler was named by Governor Cox, as United States Senator from Massachusetts to succeed the late Hon. Henry Cabot Lodge.

THE BEACON MANUFACTURING CO.

In 1904, Charles W. Owen, and his son, Charles D., and the former's cousin, Charles O. Dexter, purchased the plant which had been built by the Mt. Pleasant Mfg. Company, and which concern because of insufficient capital had been reorganized by C. E. Riley & Company, of Boston, as the Beacon Manufacturing Co. The new corporation operated several years, manufacturing yarns from waste, and then failed. The plant was closed and the machinery was sold and shipped to Paducah, Ky., and when Messrs. Owen & Dexter bought the property the mill was empty except for the shafting, engine and boiler plant. At that time, the available floor space was 35,000 square feet, and in the intervening quarter of a century the officials of the new Beacon Manufacturing Co. have made additions until, today, there are 450,000 square feet of space devoted to manufacturing, and 150,000 square feet of storage space. In the spring of 1905, 78 looms were installed, and today the Beacon unit operates 752 in the New Bedford plant, as well as 16,128 spindles.

The production of blankets was begun, under the Beacon name, in 1905, and these were sold directly to the trade, Charles D. Owen, who is now the treasurer of the concern, selling the product single-handed the first year. The company has followed the direct selling policy since, and its salesmen cover the entire United States, the product going to more than 5,000 customers.

The revolution in cotton blanket manufacture that has come about in

the past quarter century, both in style and construction, was led by the Beacon unit.

A southern unit at Swannanoa, N. C., has been established, with 200,000 square feet of manufacturing space, and 110,000 square feet of storage room, with 410 looms in operation there. Sixty-five per cent of the company's operations are carried on in New Bedford.

The corporation employs 1,600 operatives, and has capital of $2,483,000. C. M. Boyd is president, Charles D. Owen, treasurer, Charles O. Dexter, secretary, and Alfred J. Magnant, superintendent. The corporation maintains sales offices in New York and Chicago.

In 1904, the Kilburn Mill was incorporated and is engaged in producing combed yarns, the two mills which make up the plant being equipped with 126,464 ring spindles. The corporation has capital of $2,250,000 and employs 1,250 operatives.

Henry L. Tiffany is president, George B. Knowles, treasurer, and R. W. Sterling, superintendent.

The Nonquitt Spinning Co. was incorporated in 1906, the plant being enlarged four years later, and now consists of two mills. The concern formerly produced fine combed yarns, single and twisted cones, tubes, skeins and warps, and the plant was then equipped with 409 cards, 195,936 ring spindles, and 24 boilers. Seventeen hundred and fifty operatives are employed, and the concern has capital of $4,800,000. In 1929 the corporation was changed to a cloth weaving unit by vote of the stockholders, and subsequently 250 looms were installed. Seventy thousand spindles were sold to the United Merchants and Manufacturers, Inc., and the remainder are being combined with the looms in manufacturing fine products.

Hendricks H. Whitman is president, P. Leroy Lamb, treasurer, Frank C. Chamberlain, clerk and Fred L. Heyes, agent.

The Page Mfg. Company was incorporated the same year and has capital of $1,000,000. The plant is equipped with 120 cards, 48 combs, 1,390 forty-inch fancy and 400 forty-inch jacquard looms, 30,720 ring, 24,416 mule and 5,000 twist spindles, and 4 boilers and 800 hands are employed.

Bentley W. Warren, Jr., is president, Francis O. McDevitt, treasurer, and John Mellor, superintendent. The company manufactures corset cloth, curtains, dress fabrics, sateens, voiles, and plain, fancy, and jacquard goods in cotton, rayon and silk mixtures.

THE SUDANETTE CO.—ANOTHER RECENT DEVELOPMENT

A little more than two years ago, William W. Hobbs, of the third generation in a family of Massachusetts cotton manufacturers, reached the conclusion that one of the greatest troubles with the textile mills was the fact that under sharp competition the product was constantly growing inferior in order to meet price competition. Cotton fabrics distinctive for individuality and high quality were rare. He set to work jointly with his associate engineers and chemists to produce a cotton fabric that would meet the most exacting requirements necessary for men's, women's and children's wear.

He realized that this fabric must embrace the luster, touch and appeal of silk, combined with the durability and washability of cotton. After a year's intensive experimenting and testing, both in the mills and finishing plant, a new cloth made of long staple cotton, spun into 120's two-ply yarn both in the warp and filling, with the count 164 threads to the inch in the

filling and 84 in the warp, was created. The twists in both warp and filling are so constructed that each gives the highest luster possible. A special finish is so impregnated into the individual cotton fibers that the more this new fabric is worn and laundered the greater becomes its luster, sheen, and the softer its texture. This product is only one example among many of what ingenious New Bedford mill owners have been doing with cotton.

Mr. Hobbs has named the fabric "Sudanette," and it is produced in sunfast and tubfast colors, costs a little more than ordinary cotton, but a great deal less than silk, and is used for garments for men, women and children, and for interior decorating.

In addition to its fine appearances under all conditions, its meritorious points are its durability, its washability, its lightness and its touch appeal. Sudanette weighs five yards to the pound against the finest imported so-called broadcloths, 3¾ yards to the pound, hence it is more flexible, softer to the touch and is more durable by reason of the finer weave.

Mr. Hobbs' grandfather, the late William Whitman, was one of the greatest textile leaders of the age and his father, Franklin W. Hobbs, president of the Arlington Mills, of Lawrence, is another prominent figure in the textile world. The Hobbs family is allied and associated with mills embracing something over 500,000 spindles and corresponding number of looms. Sudanette is now being manufactured in the plant of the Page Manufacturing Co., on 500 looms and requisite spinning capacity, and 50,000 yards are turned out weekly.

The fabric is a registered trade-marked product, the name appearing on the selvage of every yard of goods and a trade-marked label appears on every garment that is now sold by all the leading stores in this country.

It is business of this distinctive type and quality that is bringing great credit to New Bedford and helping her retain the supremacy she has always held in the manufacture of fine textiles.

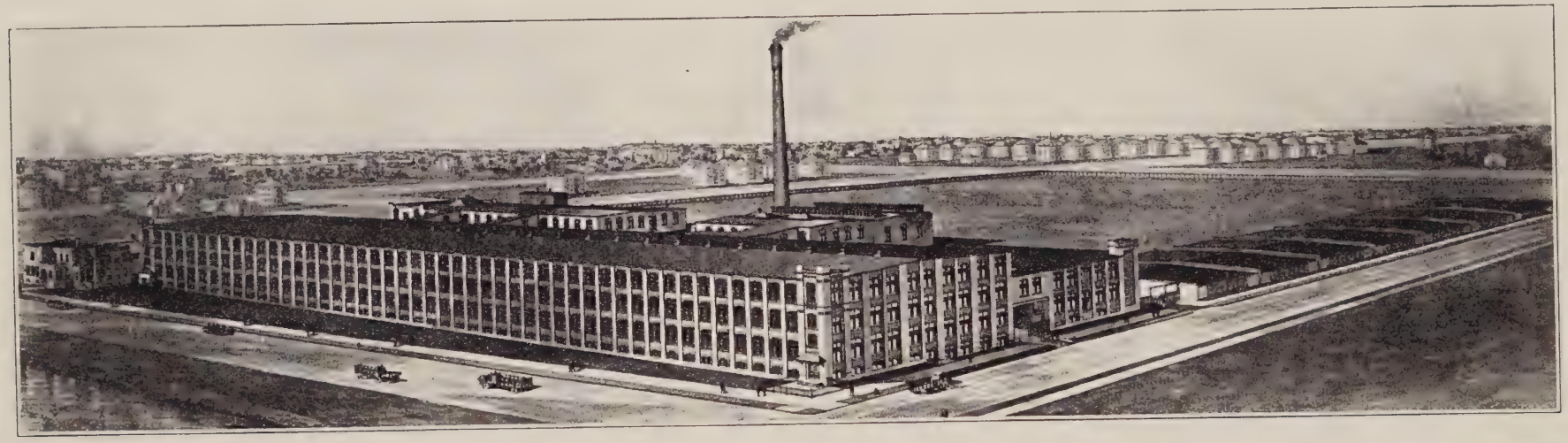
Many of the larger garment makers are already making special lines from Sudanette and the demand for it indicates that within a short time it will have a profound effect upon the New Bedford cotton industry.

There is scarcely a mill in the city that is not experimenting, not on one or two new cloths or varied constructions, but on many. Counts have been varied both up and down the scale and samples of various new cloths are constantly in the hands of the trade, awaiting the dictum of fashion.

There has been considerable recent experimentation on both drapery and dress goods lines, some of it stimulated by the buyer's desire for a change, and some turned out and offered to the trade on the initiative of mills. While much of this has been a variation of counts, several new fabrics have been developed. Then again, New Bedford mills have adopted certain new cloths that have proved desirable from other sources. The all-rayon flat crepe, as well as certain mixed crepes, are now turned out in two or three mills.

The Taber Mill was incorporated in 1906, and produces novelty fabrics in fine cotton and silk materials. The corporation has capital of $1,600,000, employs 1,200 workers in its two mills, and the plant is equipped with 120 cards, 3,000 looms, 135,720 spindles, and 8 boilers, and a branch plant is operated in Taunton.

Frederic Taber is president, F. H. Taber, vice president, William E. Kern, Jr., treasurer, John Sullivan, agent, and James Sullivan, superintendent.



HOLMES MANUFACTURING COMPANY, NEW BEDFORD

THE NASHAWENA AND HOLMES MILLS

In 1909 the Nashawena Mills were incorporated and today the concern is the largest textile unit in New Bedford. The original capital was $2,500,000, since increased to $7,500,000. At the outset 150,000 spindles and 4,000 looms were installed. These totals have since been increased to 6,100 looms, 230,000 ring and 45,400 mule spindles, and 19 boilers, while 3,000 operatives are employed in the production of fine cotton and silk fabrics, jacquard novelties and combed cotton yarns.

Malcolm D. Whitman is president, William B. Gardner, treasurer, Frank C. Chamberlain, clerk, and John L. Burton, agent.

In 1909 the Holmes Manufacturing Company was incorporated, and today the plant is equipped with 70,000 ring and 24,000 twist spindles, complete bleaching and finishing departments, and eight boilers.

Six hundred hands are employed in the manufacture of mercerized, bleached and colored yarn. The corporation has capital of $1,200,000. C. L. Harding is president, Angier L. Goodwin, clerk, Charles M. Holmes, treasurer and agent, and Everett M. Cushman, superintendent.

PIERCE BROS., LTD., AND THE BOOTH MFG. CO.

The same year Pierce Brothers, Ltd., was incorporated, with capital of $700,000, since increased to $1,000,000. Plain and fancy fabrics are produced by 400 employees. The equipment of the plant includes 1,181 looms, 23,040 ring and 28,400 mule spindles, and six boilers.

Andrew G. Pierce, Jr., is president, Albert R. Pierce, buyer, and Edward T. Pierce, treasurer.

In 1910 the Booth Mfg. Company incorporated, and today has capital of $1,196,900. It is engaged in the manufacture of fine and fancy cotton and silk goods, and 800 operatives are employed in the two mills. The equipment includes 100 cards, 1,770 looms, 32,276 ring, 13,000 mule and 2,500 twist spindles, and 8 boilers.

Charles E. Riley is president, Oliver F. Brown, vice president, Edgar F. Taber, treasurer, Joseph W. Bailey, agent and William C. Zilstra, superintendent.

In 1910 the Acushnet Process Co. was formed by P. E. Young, Frank R. Peabody, and Allen Weeks, with capital stock of $25,000 and in a small two story brick building 71 by 25 feet, the deresination of Mexican Guayule rubber was carried on from 1910 to 1912, and from the latter year to 1914 the deresination of Pontianic and Guayule rubber. In the latter year, the concern started the recovery of the crude rubber in uncured friction scrap, and at present this type of operation amounts to about 50 per cent of the company's business. About 1923 the concern began the manufacture of water bottles, syringes, ice and bathing caps, and rubber specialties, until today approximately half of the production is in these lines.

The plant has been increased by many additions, and the capital today consists of 10,000 shares of no par common, and 2,197 shares of $100 preferred. One hundred and twenty-five operatives are employed. Philip E. Young is president, and F. M. Stewart, treasurer.

THE NEILD, QUISSETT AND SHARP MILLS

The Neild Manufacturing Corporation, with capital of $1,200,000 was incorporated in 1910, and manufactures plain and fancy silk and mercerized specialties, employing 650 operatives. The plant is equipped with 33,368 ring, 26,268 mule and 1,000 twist spindles, 1,640 broad looms, 108

cards, and 8 boilers. In 1922, the corporation paid a 50 per cent stock dividend.

Frank I. Neild is president and general manager, Joseph H. Allen clerk and treasurer, and Ernest Neild, superintendent.

The same year the New Bedford Textile Co., with capital of $25,000, was incorporated to manufacture mule banding, cotton cordage, braided spindle banding and lacing, and hook bands. C. R. Gridley is treasurer, and S. J. Besse, president.

The Quissett Mill was incorporated in 1910, and now has capital of $2,000,000. Cotton yarns in all numbers, plys and descriptions are produced, and 900 operatives are employed.

Interesting are the figures of this recently established cotton unit, which began paying dividends in 1913. Up to the end of 1926, it had returned to its shareholders, figuring a 60 per cent stock dividend declared in 1922, an average per year of 25.31 per cent. Since 1912 it has increased its surplus by $442,237, this account standing at the end of 1925 at $794,238, and the stock dividend having been paid out of this item.

The equipment of the plant includes 240 cards, 80,000 ring and 20,000 twist spindles, and 10 boilers. Hon. William M. Butler is president, Edward H. Cook, treasurer, and Thomas F. Glennon, agent.

The Sharp Manufacturing Co. was incorporated the same year, to manufacture single and twisted fine combed yarns, thread yarns in the grey, and fine combed fabrics, and 1,000 Draper automatic looms, 180,000 ring and mule spindles, and 10 boilers constitute the equipment. The corporation has capital of $3,800,000.

On February 5, 1929, the stockholders voted to liquidate the enterprise.

The Fairhaven Mills, equipped with 42,360 ring spindles, and 8 looms, are in process of liquidation.

SOME RECENTLY INCORPORATED CONCERNS

In 1917 the New Bedford Spinning Co. was incorporated, with capital of $200,000, Robert Amory being president, James H. Whitehead, treasurer, and John Catterall, agent.

Handkerchief cloth, voiles, crepes and fine cotton goods are produced, 250 operatives being employed. The plant has 70 cards, 50 broad and 193 narrow looms, and 17,088 ring spindles.

The New England Cotton Waste Co. was incorporated in 1918, with capital of $25,000 and produces cotton waste, 30 hands being employed. William O. Devoll is president and treasurer, and William J. Shea, superintendent.

In 1922 the New England Yarn Singeing Co. was incorporated, for the singeing of two-ply yarn on warp frames, and today the concern has a capacity of 10,000 pounds weekly. Alfred C. Gillespie is president, and Daniel M. Clancy, secretary and treasurer, of the corporation.

NEW TEXTILE UNITS OF THIS DECADE

In 1924 the Devon Mills, Inc., were incorporated, with capital of $500,000, and constitute the New Bedford units of the Goodyear Tire & Rubber Co., of Akron, Ohio. The plant is equipped with 57,450 ring and 16,432 twist spindles, 405 cards, 94 broad looms, and 4 boilers, and 1,300 operatives are employed in producing tire fabrics. L. S. Hall is superintendent of the plant.

Historically, the Devon Mills, Inc., date back to Charles Goodyear, who,

in 1839, discovered the process of vulcanizing rubber and fabric—thus making possible the great rubber and fabric industry of today.

His was the discovery that inaugurated the real usefulness of rubber in the world, and the product soon entered into fields of service that had never before been trod.

It is noteworthy, also, that Goodyear laid the foundation of the rubber industry in New England, as he began the manufacture of a few rubber-fabric products in Springfield.

Undoubtedly his efforts were responsible in a measure for the establishment and growth of the textile industry of New England.

The plant now known as the Devon Mills was built in 1893, and occupies the site of what was once the Rowland and Rotch Mills, which were later bought by the New England Cotton Yarn Company, at which time they became the Howland and Rotch department of the New England concern. The latter organization was later sold to a new group called the Passaic Mills, which ultimately came into the ownership of New York interests headed by Myron C. Taylor, chairman of the finance committee of the United States Steel Company.

The mills were enlarged, modernized and rendered suitable for the manufacture of tire yarns, the product being marketed through the New York firm of Taylor, Armitage and Eagles. The firm was later reorganized under the name of the American Cotton Fabric Corporation and the plant finally was sold to the Goodyear Tire & Rubber Company, of Akron, O., and the Fisk Tire Company of Chicopee Falls, each acquiring fifty per cent of the assets.

The importance of cotton fabric in the manufacture of rubber products cannot be over-estimated and the activities of the Devon Mills in producing a large share of the fabric used in the manufacture of Goodyear tires and other products is outstanding.

Thus it will be seen that New England, by producing Charles Goodyear and by furnishing through its mills a large share of the fabric for rubber manufacturers, has made some signal contributions to American industry.

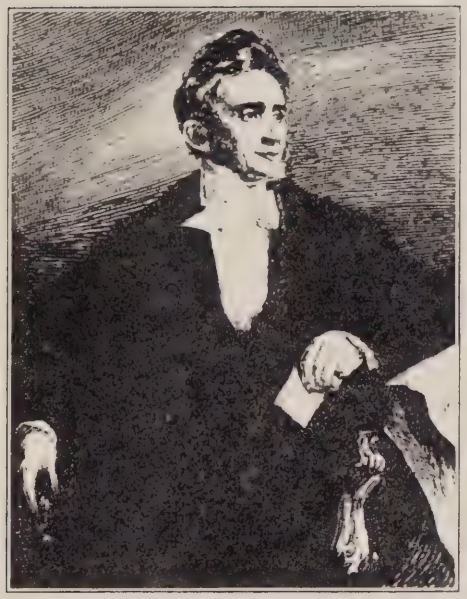
Charles Goodyear was born in New Haven, Conn., December 29, 1800, and spent his early childhood in that city. At the age of seventeen he became an apprentice in the hardware business in Philadelphia, remaining there until he became of age, when he returned to New Haven and entered business with his father, who was then engagd in manufacturing agricultural implements. Later he opened a store for the sale of domestic hardware, in Philadelphia.

His first interest in rubber is recorded in an incident which occurred when he presented his eight years old daughter with a pair of India rubber shoes made of the native gum, but very clumsy, and bound round the ankle with fur.

In 1829, Goodyear's health began to fail and he was not a well man from that year until his death. He suffered reverses in business and during the following ten years was repeatedly imprisoned for debt.

Losing everything to his creditors, even his agricultural inventions, his thoughts turned to other lines. About 1832, the manufacture of gum elastic of India rubber was begun in the United States and Goodyear read with interest everything he could find on the subject and examined carefully such articles as were made of it.

He came to the conclusion that, while rubber articles were useful, they could not be entirely practical until some method was found to make the raw material impervious to heat or extreme cold. Daniel Webster, who



CHARLES GOODYEAR
Inventor of the Vulcanizing Process of Treating Rubber
(From an Artist's sketch)



DEVON MILLS, INC., NEW BEDFORD
Subsidiary of the Goodyear Tire Company

was Mr. Goodyear's counsel in his patent litigation, humorously referred to a fine cloak of India rubber he once owned, stating that in cold weather it stood well by itself, and that he often put it out on the porch surmounted by his hat, while many passing by mistook it for the Sage of Marshfield himself.

Goodyear made numerous experiments, always seeking to find the secret which would overcome the difficulties inherent in crude rubber, and success ultimately crowned his efforts.

While sitting in his kitchen a piece of gum which he was holding in his hand, accidentally fell upon the stove, and charred like leather. He had discovered the secret of "curing" or vulcanizing rubber. Later experiments, in which he heated rubber, mixed with sulphur, completed the process upon which is based the present-day methods of curing rubber products.

The first ray of hope came when he found that by boiling a compound of rubber, gum and magnesia in quicklime and water, an article was obtained that seemed to be all that could be desired, and he obtained a patent on the process and sold his product readily, but it soon developed that a drop of weak acid, such as cider, vinegar or even rain water, destroyed the effect of the lime, and rendered the fabric sticky.

Regarded as an object of ridicule, dubbed the "India-rubber maniac," described as a "man with an India-rubber coat, India-rubber shoes, an India-rubber cap and in his pocket, an India-rubber purse and not a cent in it" he settled in Roxbury, where E. M. Chaffee placed at his disposal the plant of the Roxbury Rubber Co., and for a time Goodyear prospered selling rights under his patent, but the nitric acid process he had evolved covered only the surface of the material and the goods were valueless, except in the form of the thinnest fabrics. His bright prospects vanished, his property was sold, and again he was penniless.

Nathaniel Hayward, who was in Goodyear's employ, tried an experiment by spreading sulphur on the surface and drying it in the sun. This method carried the germ of a thought to Goodyear, who even sold his children's school books in order to obtain money with which to purchase raw materials, and in 1844, aided by his brother-in-law, William De Forrest, he obtained his patent on vulcanized rubber. Then followed upwards of sixty other patents, and the original grant was extended in 1857. Numerous medals, awards and honors came to Charles Goodyear for his contributions to rubber production.

The most reliable historical account of his first "accidental" discovery records the fact that around the edge of the piece of charred rubber there was an edge of fabric, not charred, but perfectly cured, and the use of fabrics in connection with rubber goods manufacture developed slowly from that time.

Many improvements have since been made in rubber manufacturing, particularly in tires and a number, developed by Goodyear engineers, as well as by others, in the methods of producing fabrics and their application to tire manufacture.

In the early days of the industry, all products were "fabric," or high pressure tires. The development of the cord tire was probably the most important contribution to the automotive industry as it produced the principle of the balloon tire, without which motoring would not hold its present degree of comfort and freedom from trouble.

In the manufacturing process, tires are built up on a core, ply upon ply, of rubberized fabric, the latter being impregnated with rubber after

it reaches the tire plant. All original fabric used in making fabric tires was square woven, the cords in the fabric being of equal size. Their weakness lay in the fact that, when the tire was in service, the cords tended to chafe or saw their way through each other, causing rapid failure of the tire carcass, particularly at the "shoulder" of the tire.

Changes in the weaving of tire fabric, coupled with many experiments finally led the Goodyear engineers to the discovery that the use of long cords, running parallel to each other, with very thin cross cords, which would break in vulcanization, would correct this weakness, and produce a tire possessed of longer wearing qualities. This method overcame the "sawing" action, inasmuch as the cross cords were eliminated and superseded by rubber-impregnated parallel cords.

With the development of the balloon tire, the Goodyear engineers evolved after a long period of research a "Supertwist" cord, which has become an exclusive Goodyear product, and is made in the Devon Mills, and which represents a great advance in tire production development.

The process of weaving the fabric produces an extra-elastic and extra-durable fabric applicable expressly to balloon-tire construction, allowing the shoe to stretch and recover under the shocks of the road, without damage—much as does a rubber band. The Goodyear engineers declare that its elasticity and durability have reduced blowouts and similar troubles almost to the vanishing point.

On January 3, 1928, Manomet Mill, No. 4, which was acquired the previous November 15th, by the Firestone Tire & Fabric Co., of Akron, Ohio, was put in operation by that concern, with 1,000 employees, and when two shifts are carried on this total is doubled. New equipment was installed consisting of 261 cards, 21 pickers, 115,200 ring and 26,512 twist spindles, 64 plain looms and 2 boilers, and tire fabrics are produced.

Harvey S. Firestone is president, and G. W. Danielson is superintendent. Altogether more than 3,000 operatives are employed in the five manufacturing enterprises operated by the Firestone concern, in Massachusetts and about half that total is included in the company's tire-producing units in New Bedford and Fall River.

The Ninigret division of the Fisk Tire Co., of Chicopee Falls, of which C. P. Harrington is general manager, manufactures tire yarns and fabrics, this plant having been one of the units of the old American Cotton Fabric Co. The plant has 58,968 spindles, and 74 looms, and employs 1,000 operatives.

Here are three large tire-producing corporations, whose executives have not hesitated within recent years to place several millions of dollars in cotton enterprises in New Bedford, and it is perfectly obvious that if the city, and Massachusetts, were not satisfactory places in which to conduct textile operations these three concerns could easily have purchased plants elsewhere.

In 1925, the Pemaquid Mills were incorporated, with capital of $800,000 and produce broadcloths and sateens. The plant is equipped with 33,516 ring spindles, 32 combs, 60 cards, and 456 looms, and employs 400 operatives.

Charles L. Harding is president, Eugene H. Timanus, treasurer, and J. Colby Lewis, superintendent.

The New Bedford Novelty Fabrics Co. was incorporated in 1927, with capital of $50,000 and manufactures novelty shade cloth and bed spreads. T. E. Mendes is president, Joseph Waterhouse, secretary, and Samuel Grundy, treasurer.

Perhaps the most outstanding recent textile development in the city has been made by the New Bedford Rayon Company, owned by the Rayon Company of Delaware, which acquired Manomet Mills, Nos. 1 and 2, in 1928, and began at once to refit these immense plants with machinery to produce this material in large volume. The sponsors of the enterprise carried on a careful survey of the market in all its aspects, and after examining locations north and south, decided upon New Bedford. The principal barrier to an early decision was the water supply, but following conferences with city officials this was worked out to the satisfaction of the municipality and the promoters of the enterprise.

During the past few years the part played by rayon and silk at New Bedford has been imposing. There is but one mill in the city which does not use rayon in some measure. More rayon is consumed there than at any other weaving center in the United States, and it is believed the value of rayon and silk employed in New Bedford exceeds the value of cotton going into manufacture in all plants, except those making tire yarns. There have been some local instances even of rayon and silk goods being manufactured on older types of cotton machinery adaptable to finer materials.

The plans of the New Bedford Rayon Co. call for the ultimate investment of $2,500,000. The corporation is capitalized for $4,000,000 and employed 500 hands in 1929.

J. P. Wright is president, B. F. Proud, treasurer and secretary and T. A. Duffy, vice president.

While it has proved very beneficial to fine goods concerns, the employment of rayon and silk has developed at the expense of the yarn companies, which today present the most unfavorable aspect of the New Bedford situation. A great number of spindles have been thrown out of use by the introduction of materials that could not be woven in local mills.

RECENT DEVELOPMENT OF LOCAL SILK MILLS

Many writers have failed to emphasize the development in silk mills, in Massachusetts. A number of important units have been established here within recent years and New Bedford can claim its share of them. While many still adhere to the cocoon fibre, some have become noticeably adept in fancy production in silk and rayon and silk draperies, as well as in silk novelties of a highly artistic character.

Despite the fact that the yardage produced in these Massachusetts units is not voluminous, it is significant of the growing belief that New Bedford, because of its resources in skilled operatives, rapid transportation facilities, and other advantages, offers everything required in carrying on silk production.

Within the past fifteen or twenty years there have been established in New Bedford a number of fair-sized silk concerns and today the city is the headquarters of a group of these units employing several hundred workers.

The outstanding local unit in this field is the National Spun Silk Company, which has capital of $1,000,000 and employs 2,500 operatives, in the manufacture of spun silk and fabrics, and in the spinning of silk yarns. The plant is equipped with 42,000 spindles and 186 looms.

Marcus Frieder is president, Leonard P. Frieder, vice president, and Dean Clark, treasurer.

The Gilt Edge Silk Mills were incorporated in 1912, with $100,000 capital, for the manufacture of broad silks, and today 150 hands are

employed. The plant is equipped with 160 looms, 17 winders, 11 warpers and two twisters. Phillip Dimond is president, and S. Goldfarb, treasurer and secretary, of the corporation.

The Old Colony Silk Mills Corporation, was established and incorporated by local capitalists, in 1925, with $400,000 capital, since increased to $450,000, Abbott P. Smith being president, Earle R. W. Bates, treasurer, Latimer W. Ballou, vice president, and George H. Shutt, superintendent. Today the company operates two local plants, one where the weaving operations are carried on and the other where silk throwing is done. There are now 350 employees on the payroll, and the equipment consists of 168 box looms, 12 warpers, 42 winders and 59 twisters.

The Premier Silk Mills Corporation was incorporated in 1926, with capital of $50,000, for the manufacture of broad silks and cotton and silk mixed fabrics. Burgoyne Woolley is president, treasurer and general manager of the concern.

The New Bedford Silk Mills, manufactures broad silks, and employs 175 operatives. Benj. Mathan is president, Walter Mulberger vice president, John Bosshard, secretary and Benjamin Ginsberg, treasurer, and the plant is equipped with 240 looms.

OTHER NEW BEDFORD INDUSTRIAL ENTERPRISES

In 1928, the former E. E. Taylor shoe factory was almost entirely taken by a large shoe manufacturing concern, which operates its own chain stores, and the Lefevre-Oatman Shoe Co., of Lynn, removed to New Bedford, the same year, and leased space in the Taylor plant, where it employs fifty operatives. Joseph Lefevre is president, Charles Oatman, treasurer and William O'Connor, secretary of the corporation which has capital of $50,000.

The same year, the State Pier at New Bedford, was leased by the Lamport Manufacturers' Supply Company, Inc., of New York, as a new sorting and shipping point. This new industry began operations with between 250 and 300 employees, and this total is expected to reach 700 ultimately.

The Harwood Underwear Co. began manufacturing operations in the city in 1928, and is now employing 300 hands in the production of underwear.

In 1928, the Photo-Fabric Co. started production on its new process for reproducing photographs on cloth. At a recent dinner, given by the directors of Jordan, Marsh Co., of Boston, the souvenir napkins were decorated with photographs of the guests of honor, reproduced on the cloth by the Photo-Fabric Process. The napkins were made of Sudanette, the super-fine cotton fabric, recently developed by the Page Manufacturing Co., of New Bedford. W. S. Thompson is president and D. S. Weedon treasurer and secretary of the Photo-Fabric Co., which has capital of $50,000.

In 1929 the Lincoln Shirt Co. was formed and began operations with 125 employees.

The casual visitor in New Bedford naturally reaches the conclusion that there are few, if any local manufactures other than textiles, but were he to make a careful tour of the city's streets he would discover numerous toy, valve, reed, brush, shuttle, sheet metal, leather belting, soap, wrench, woodworking, screw, rivet and box industries, as well as producers of foods and beverages, iron castings, mill and engineers' supplies, cotton machinery, canvas products, colors, insulating tubes, tanks,

flues, beam heads, fishing machinery, paints, storage batteries, oils, cabinets, ring travelers, top rolls, cut glass, etc.

William R. West has long been employed in the manufacture of top rolls for cotton spinning, and employs 100 operatives. The concern has capital of $166,000.

The Acushnet Iron Co., owned by P. C. Davis, produces iron castings, and employs 50 men.

The Continental Wood Screw Co., with capital of $150,000, is engaged in the manufacture of screws and stove bolts, William R. West being the president and Patrick Sweeney, treasurer, of the concern.

The New Bedford Shuttle Co., produces shuttles and shuttle irons. Arthur S. Wattles being president, and Arthur G. Seabury, treasurer and secretary, of the corporation, which has capital of $92,233. Fifty hands are employed.

The Baker Machine Co. employs 30 operatives in the manufacture of cotton machinery, Luke K. Keith being treasurer and secretary, and Z. B. Davis, president, of the corporation which is capitalized for $22,000.

For many years Frederick C. Washburn has been engaged in the manufacture of textile specialties, under the name of "Washburn," and employs 50 hands.

The Fibro Products Co., of which Samuel B. Finger is president, and Thornton L. Lyman, treasurer, produces insulating tubes, 40 operatives being employed.

Franklin J. Gurney is president and secretary, and Frederic B. Hawes, treasurer, of the Acushnet Saw Mills Co., which concern employs 100 operatives, in manufacturing boxes and lumber. The corporation has capital of $50,000.

The Allen Company, with capital of $25,000, employs 25 hands in producing wooden beam heads and section beams, R. Udell Thornton being president and secretary, Byron I. Thornton, vice president, and Ray Thornton, treasurer.

Capitalized for $100,000, and employing 40 operatives, the C. E. Beckman Co., of which J. F. Briggs is president, and M. S. Cabral, is treasurer, is engaged in manufacturing canvas products.

William H. Knowles owns the Knowles Loom Reed Works, which manufactures loom reeds.

The New Bedford Brush Co., Inc., a branch of The Woonsocket Brush Co., of Woonsocket, R. I., is engaged in the production of textile, jewelers' and silversmiths' brushes, Vincent E. Allen being president, Oscar E. Lussier, treasurer, George A. Reichenberg, assistant treasurer, and William F. McDermott, secretary, of the corporation.

The Standard Ring Traveler Co., of which Jeremiah Goff is president, James Black, vice president and George H. Hedge, secretary and treasurer, manufactures spring and twisting travelers and wire specialties.

The Greene & Wood Planing Mill, also operating The Wood Lumber Co., in Falmouth, is engaged in woodworking, the concern being a partnership, made up of Edmund and George R. Wood. Fifty hands are employed.

Andrew Gunning is president, and I. C. Noble, treasurer, of the Gunning Boiler & Machine Co., which has capital of $100,000 and employs fifty men, in the production of steel tanks, flues and structural steel work.

The H. & E. Wrench Co., capitalized for $750,000, produces wrenches, and employs 40 operatives. George E. Hemphill is president and Arthur G. Seabury, secretary and treasurer.

George A. Kirby is president, and Robert H. Coggswell, is treasurer of the George Kirby, Jr., Paint Co., which is capitalized for $50,000, and which is engaged in the manufacture of paint.

The New Bedford Valve Mfg. Co., with capital of $10,000, produces high pressure valves, Clark W. Holcomb being president, and A. W. Omey, secretary and treasurer, of the corporation.

Chester F. Hathaway, and Eli G. Braley, as partners, operate the Hathaway Machinery Co., and employ thirty hands in the manufacture of marine fishing machinery.

John P. Smith is president and treasurer of F. L. Hervey & Co., which concern employs seventy-five operatives in the production of leather belting. The concern also operates a plant in Fall River and has capital of $100,000.

William F. Nye, Inc., with capital of $100,000, employs thirty hands in the production of watch and clock oils, F. G. Kelley being president and Howard I. Wordwell, treasurer, of the concern.

The Frank L. Young Co. employs 70 operatives in the manufacture of fish and sperm oils, the concern having capital of $750,000 and operating another factory in Boston. Cornelius J. Murphy is president, Harold W. Young, secretary, and Percy L. Young, treasurer.

New Bedford is the home of a well-known toy concern—the Weeden Manufacturing Company, employing seventy-five operatives in the production of toy steam engines, Homer W. Hervey being president, and William Ritchie, treasurer, of the corporation, whose novel commodities enjoy a wide field of distribution.

Thomas Hersom, Jr., owns the concern known as Thomas Hersom & Co., and is engaged in producing soap and soap powders.

The Perfection Laundry Corporation employs 50 operatives, William R. Benoit being president, and J. P. St. Germain, treasurer of the concern.

The F. E. Earle Company, of which Frederic E. Earle is president and treasurer, employs 75 hands in the field of contracting and building, specializing in industrial construction.

W. A. Robinson & Co., Inc., with capital of $150,000, is engaged in refining sperm, whale and fish oils. William A. Robinson, Sr., is president, William F. Gifford, vice president and secretary, and William A. Robinson, Jr., treasurer, of the concern.

The Charles T. Smith Co., Inc., is engaged in manufacturing carbonated beverages, the corporation having capital of $100,000. James P. Doran is president, James D. Watson, secretary, and Charles T. Smith, treasurer.

E. Anthony & Sons, Inc., of which Benjamin H. Anthony is president and treasurer, and Edmund Anthony, secretary, employs 175 in the production of newspapers, the concern having capital of $50,000.

The Babbitt Steam Specialty Co., with capital of $30,000 is engaged in manufacturing mill and engineers' specialties, producing the Babbitt adjustable sprocket rim, and the Babbitt loom crank among its numerous devices. John A. Stitt is president, and I. N. Babbitt, treasurer.

The Baker Mfg. Co., owned by James G. Baker is engaged in printing and binding, and employs 40 hands.

The city has long been fortunate in possessing ample storage facilities for raw cotton, and today it has two units, whose warehouses on the water front, are imposing buildings—the New Bedford Storage Warehouse Co., capitalized for $600,000 and employing fifty hands, Abbott P. Smith, president, Frederic Taber, vice president, and Howard C. Dyer,

clerk and treasurer, operating a main plant and two branches; and the New Bedford Public Warehouse, owned by William G. Welsh.

One of the two Massachusetts plants of the New England Oil Refining Co. is located in New Bedford, and the city also has branch units of the Atlas Plywood Corporation, of Boston, manufacturers of box shooks and packing cases; the J. W. Bishop Co., of Worcester, construction engineers and builders; the Eastern Dairies, Inc., of Springfield, purveyors of ice cream; the National Biscuit Co., and the Massachusetts Baking Co., dealing in bakery products, and John P. Squire & Co., producing pork products.

WHAT SOME OF THE MILLS ARE DOING TODAY

In the fine cotton field, no single manufacturing center in the cotton mill world has expended more money and developed more new fine-yarn textile types than New Bedford. One very large plant there, constructed more than forty years ago as a high type of very fine combed-yarn cloth mill, chiefly in plain weaves, is today producing the finest grades of synthetic fabrics manufactured in America, doing its own quilling, dyeing, and beaming, and weaving everything from the sheerest georgette crepes to some of the most exquisite sheer colored rayon draperies produced anywhere by power machinery. Many of these cloths require only simple finishing processes before they are ready for the counters, while many others are the foundation cloths on which some of the best quality fabric-printing in the world is being done at the present time.

What is true of this single mill, is equally true in some degree of more than a score of concerns located in this center of American fine-goods output. This work merely supplements a great volume of yardage turned out for lining, printing and general dress purposes. Such mills as the Butler, Pierce, Nashawena, Whitman, Booth, Dartmouth, Taber, Grinnell, Holmes, and others in New Bedford, are only suggestive of textile revolutions that have occurred in a few years in the character and quality of output. There are dozens of other plants in Massachusetts where new types of production have supplanted old forms, not because quality has been better elsewhere at lower prices, but because style demands have called for new goods, and money has been invested with skill, to supply the demands of consumers.

In the manufacture of sheets and pillow cases the change in processes has been revolutionary, due to the creation of and demand for finer constructions, as well as for colors. The products of such mills as Wamsutta, have been widely advertised to the consuming public with the result that these trade-marked products are steadily displacing nondescript and non-advertised goods in the homes throughout the country. Sheets and pillow cases, in solid colors and in white with colored borders, in attractive packages, have found a much greater appeal and their advertising has resulted in the building of sales to new heights. In this branch of the cotton industry there has been real progress by enterprising Massachusetts manufacturers.

There is one distinctive feature in connection with New Bedford's textile industry, in that practically no bleaching or dyeing, of fabrics is done within the city itself, due to the fact that the fresh water supply is inadequate to meet the enormous demands made by these processes. The great part of the finishing of its products is carried on at such nearby points as Wareham, North Dighton, Woonsocket, Pawtucket and other centers.

The textile industry in Massachusetts is far from decadent, and will

be so long as the pioneering spirit of the founders of the industry is displayed by their successors. Many of the oldest mills, located in Fall River, New Bedford, Lowell and Taunton, are as up-to-date in equipment as the very latest units in other sections of the country. The cumulative skill and experience cannot be lost or taken away, and the textile industry of this section will still be a factor when the youngest bobbin-boy of today is a greybeard.

AN ANALYSIS OF THE SITUATION

Within recent months the United States Government released some statistics, which, on their face, indicated a startling condition and conveyed the impression that the entire cotton textile industry of this section was on wheels and headed South.

But an analysis of the data showed how easy it is for figures to lie and liars to figure.

Nobody questioned the accuracy of the statistics, but certain individuals, in private offices, drew some very questionable conclusions therefrom, which were religiously circulated in other parts of the country.

The major trouble with the statistics is that the government persisted in treating the entire cotton textile industry as if it were one sole unit, whereas every textile operator knows that there is as much difference between its two main branches—the coarse and fine good units—as there is between the General Electric Company and the Waltham Watch Company. Both the latter use steel and other metals in making their products, but there the resemblance ends.

Every textile man who has even a cursory knowledge of conditions appreciates that in all the states of the South where cotton manufacturing is carried on there are not in excess of half a dozen mills competing with the fine goods factories located in the city of New Bedford.

They know, as a matter of fact and of record, that the fine goods textile industry is more firmly entrenched in New Bedford than ever before, for the South has learned from a few harrowing experiments that it cannot successfully compete with this section in the manufacture of these fabrics, and has abandoned any attempt to enter the field. Ten years ago southern manufacturers had rosy visions of ultimately succeeding in the manufacture of the finer goods, but the experiment proved costly, and the fine goods plants in the North are unchallenged today.

What better proof does the most destructive critic require that this is the fact than to survey the figures applying to New Bedford? He finds that the net quick assets of the New Bedford cotton mills, making no allowances whatsoever for their real estate or their plant equipment, increased from $11,076,099 in 1917, to more than $36,566,399 in 1927.

No other city of comparable size, North or South, whether making coarse-goods or fine goods, can approach these figures, but unfortunately, the facts applying to New Bedford find no mention in the government reports.

Only an expert analyst of the production figures for 1925, released by the federal authorities, would observe that they indicate a big increase in the manufacture of the fine goods New Bedford makes as compared with the coarse goods that are produced below the Mason and Dixon line.

The layman would be beguiled into believing that the government report spelled the end of textile production in the North. But gross figures are often very misleading, and in this case grossly so.

It is admitted that the coarse goods market is possessed by the South.

On that point there can be no honest dispute. But the government statistics do not show that that is the only textile line in which this section is not making significant strides—so great, in fact, that New Bedford, the seat of the fine goods production, is not deploring the change, because the finer the fabric the higher the wages received by skilled employees, and the greater the ultimate profits for the more efficient mills.

The government report cited 4,000,000 idle spindles in the North and but 500,000 in the South, but there was no footnote or word of explanation to the effect that in almost all cases these were abandoned spindles, which had not the remotest connection with the cotton textile industry of the year 1927.

For example, until within a few months in New Bedford, there were 350,000 abandoned spindles, in the Manomet Mills, which specialized in tire yarns in the days when this product was fashioned out of Egyptian long staple cotton by processes which necessitated the use of skilled labor. The progress of invention, and new scientific discoveries effected in 1920, when the price of Egyptian cotton rose to ten times the cost of Texas low middling cotton, simply resulted in transferring tire yarns from the fine goods to the coarse goods classification, and the industry went South where the product could be made by unskilled labor.

But the government took no cognizance of this fact and listed the New Bedford spindles as idle, while the fact was they had been for sale for a long time and had no more to do with present day conditions than the abandoned piers where New Bedford whalers tied up in the sixties and seventies. These idle plants have since been acquired by new interests and are now in operation.

There are in New Bedford many thousand more spindles that are idle today, which were installed when New Bedford textile products were fashioned exclusively from cotton. But the textile plants of the city are making finer fabrics now than then and fashioning them out of silk and rayon. This forward step has called into action more skilful labor at higher wages than was the case under the old regime, and, fortunately, has been profitable to the managements.

THE REAL STORY OF NEW BEDFORD'S SPINDLES

But no credit was given in the government reports to obsolete spindles, and to the uninitiated the totals appeared as live spindles. As a matter of fact, every New Bedford spindle which was a factor in the industry of 1927 ran pretty close to full time, that year, and every loom was operated at least the lawful number of hours, while many of them took care of two shifts.

The live spindles in New Bedford averaged the full 48-hour week allowed under the laws of Massachusetts, but because of the government's arithmetic the figures indicated that the spindles of Massachusetts operated only an average of 6¼ hours per working day, in March, 1927. In another respect the government report was misleading. It indicated an increase of some 500,000 new spindles in the South in the last year for which figures were available. To the layman that appeared startling. In actuality it meant that several big states (North and South Carolina together are 83,415 square miles in area as against 66,424 square miles in the six New England states, while Texas alone has four times the combined area of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut), added the equivalent of two fairly large New Bedford textile mills to their capacity. As a matter of fact, there are half

a dozen plants in New Bedford larger than the increase in the southern state which showed the biggest gain, and there are few textile mills in the Whaling City as small as the gain that was registered in most of the southern textile states.

The government report also emphasized that there were more spindles in the South than in New England, but it did not add that the entire cotton manufacturing district of New England, which is largely confined to Massachusetts, Rhode Island and Connecticut, would look rather small if transplanted to North Carolina with its 52,426 square miles of area as against the 14,479 square miles contained in the three southern New England commonwealths, or in South Carolina, with its 30,989 square miles of territory. It also failed to emphasize the fact that there are today about 40 per cent as many cotton spindles in Bristol County (Massachusetts), as there are in the entire South, and about 1,000,000 more than there are in any one of the southern states where cotton goods are produced.

To sum up, the fact of the matter is that only in coarse goods and certain other staple weaves, such as sheetings, which are little affected by styles, does the South have certain advantages which have conspired for the moment at least to give it the lead.

But the section south of the Mason and Dixon line, days and days away from the style centers, can never keep pace with style changes, which, since the World War, have been almost kaleidoscopic and which may make a fabric obsolete even in the few days it takes to transport it to the finishing plant.

Even the *Manufacturers' Record* published at Baltimore, and distinctly a pro-southern journal, admitted in its April 14, 1927, issue that "less than 10 per cent of the aggregate value of southern manufactures (in 1926) is a textile product, and, great as has been the development in the cotton industry in the South in the past few years, general manufacturing is making greater progress."

The *Record* said in the same issue that the textile industry has a total investment in the South of over $1,000,000,000, and in approximating this amount it named as the "Southern States," the following:

Alabama, Arkansas, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia.

In the aggregate, these 14 states have 336,301 square miles of territory, within their geographical limits, while the six New England states have a total of 66,424 square miles. In other words, the southern states have approximately 13½ times the territory that is embraced in New England.

THE NORTH AND THE SOUTH

Let us see how our investment in existing and operating textile concerns lines up with that of the South.

There are in New Bedford no less than 38 going textile concerns, whose aggregate capitalization is almost $67,000,000; in Fall River there are 68 textile units, whose aggregate capital investment is in excess of $40,000,000; in Lowell there are 55 textile concerns, with aggregate capital of $22,935,500, while in the other cities and towns in Massachusetts there are 560 textile plants, with capital investments of upwards of $400,000,000, so that in Massachusetts alone there are today operating textile mills whose capital investment exceeds $530,000,000, or more than 50 percent of the total investment in all the fourteen southern states. In

this statement no consideration is given to the textile units in Maine, New Hampshire, Vermont, Rhode Island and Connecticut.

When the southern states, large as they are, are able to show that they hold first place in production in the United States in 36 distinct lines of manufactured goods, as does New England, according to the last census of United States manufactures, then it will be time for them to claim industrial supremacy. Of these thirty-six lines, Massachusetts has the undisputed supremacy in twenty-four lines; Connecticut in ten, and Rhode Island and Vermont in one each.

The *Manufacturers' Record* cites the fact that the fourteen southern states manufactured, in 1925, products valued at $10,372,185,000. When one compares the figures that apply to New England, which possesses a little over 2 per cent of the territory in the United States, and which produces over 11 per cent of the manufactured products of the nation, valued at upwards of $7,000,000,000 annually, it is observed, when we measure the territory embraced in the fourteen southern states cited, they should show products valued at nearly $95,000,000,000, if they are to claim supremacy over the New England states.

To state it differently, the six New England commonwealths, with 66,424 square miles of territory produce more than $7,000,000,000 worth of manufactured goods a year, while the fourteen southern states, with approximately 13½ times the territory—886,301 square miles—produce but $10,372,185,000 worth of manufactured commodities annually.

Nor is this all. Massachusetts ranks second in the production of nineteen other lines of products, not included in the twenty-four lines in which it is first, and in eleven other lines it stands third, and in one other, fourth. Connecticut ranks second in three other lines, besides the ten in which she holds supremacy, and is fourth in two others, while Rhode Island ranks second in one line, and Maine is second in another.

SOME SIGNIFICANT FIGURES

According to data released by the Massachusetts Department of Labor and Industries on March 25, 1927, the value of cotton goods products including cotton small wares, made by manufacturers in Massachusetts during 1925 was $345,864,097, or $49,032,813 more than the value of their cotton products in 1924. These 1925 figures were returned from but 178 cotton concerns, and do not include the value of the products of sixty-five textile dyeing and finishing concerns in Massachusetts, which amounted to $119,109,701 that same year. The 1925 products of eighty-eight knit goods concerns in Massachusetts were valued at $46,386,519, while twenty-seven silk manufacturers in this state produced goods that year amounting to $36,608,014.

The textiles reporting to the department thus show a grand total of value against a total value of products made by the same group in 1924, of $726,796,884, or a one year increase of $130,730,358 which, it seems, indicates a rather peculiar type of "decline."

Long years ago it was written that there are two sides to every story, and this assertion is quite true of the textile world today.

There is no gainsaying that mortalities have been more frequent in textile operation in New England than in any other line of industry but is that particularly surprising when it is recognized that from the very beginning of American industry this section has been predominantly the textile producing center.

There is no denying the fact that many millions of dollars of New

England money have been invested within the past quarter of a century in textile plants located south of the Mason and Dixon line, but there appears to be a unanimity of opinion among the textile leaders of Massachusetts that the South has perhaps passed its peak and is now receding from the high water mark.

There is agreement among textile men of Massachusetts who are operating plants in this state and in North Carolina that at present the tax burdens of these two Commonwealths are so nearly identical as to indicate very little if any advantage to one over the other. There is a well-founded belief that the South has seen its best days as a textile center competing with the North, and that henceforth the former differential which existed in favor of the South will rapidly disappear and in the course of a few years will completely pass out of the picture.

It is often difficult on account of the perspective to satisfactorily appraise the situation, and when one observes textile concerns closing down, removing elsewhere or passing into bankruptcy, the other side of the picture is frequently overlooked.

It is not the contention of the writer that all is well with New England textiles, and he has no desire to hide the facts. It is an open secret that New England textiles overextended during the World War, and with the radical changes in women's dress, over-production resulted. Add to these factors, the reluctance on the part of some New England manufacturers to adopt twentieth century methods of marketing and distribution; their negligence in seeking new outlets for their products; their hidebound adherence to obsolete machinery and worn-out production methods, with the resulting inefficiency; the limitations of working hours under which they stagger as compared with their more fortunate brethren in competitive states, and many other factors, it is clear that production has been limited and profits have been narrowed or eliminated. But are we peculiar to ourselves? Are all our troubles local? The writer has carefully analyzed the situation in Massachusetts and he finds that while we have been losing many textile units during the past ten or fifteen years some of the southern textile states have been suffering similarly.

Using the 1926 edition of Davison's Blue Book, issued in July, 1927, as the index, it is learned that in the state of North Carolina alone at least a baker's dozen textile concerns found themselves bankrupt, or closed down in 1926—two in Charlotte; one in North Charlotte; two in Winston-Salem; and one each in Cherryville, Durham, Newton, Salisbury, Burlington, Concord, Haw River, and Shelby.

Using the same source of information and the 1926 edition of the Directory of Massachusetts Manufacturers, issued under the editorial supervision of the Associated Industries of Massachusetts, in November, 1926, it is observed that in that year there were in operation in Massachusetts upwards of 600 textile plants of all kinds, exclusive of those devoted to the production of textile machinery and textile supplies.

Of this total, 132 were established between 1920 and the early part of 1926.

There are five major branches of the textile industry of the United States. Based on (1) invested capital; (2) value of products and (3) value added by manufacture, the relative proportion of each is cotton manufacture, 42 per cent; wool and worsted manufacture, 26 per cent; knit goods and hosiery manufacture, 14 per cent; silk manufacture, 13 per cent; dyeing and finishing (separate establishments) 5 per cent; total 100 per cent.

The cotton industry is now about evenly divided between the North and the South. There is still more machinery in the North, but some of it is not operating.

The southern mills manufacture heavier and coarser goods than these products average in the North and as they run at greater capacity due to longer working hours, they use more cotton than the fine goods mills of New England.

Eighty-eight per cent of the knit goods manufactured are located north of the Mason and Dixon line; 12 per cent south of it. A recent directory publication shows there are fewer knitting mills in the South than there were four years ago.

The woolen and worsted and silk industries are 98 per cent in the North; 2 per cent in the South.

THE 1928 STRIKE

In 1928 the great majority of the spindles and looms of New Bedford were silenced for twenty-five weeks by what perhaps was the most important textile controversy since the trouble in Lawrence in 1912.

A 10 per cent wage cut was ordered in all but one of New Bedford's fine goods mills after a reduction of like amount had been made in most other competing mills in Maine, New Hampshire and Massachusetts. On April 16, the effective date, a strike was called in each of the New Bedford plants involved, and the tie-up was well-nigh complete, twenty-six corporations operating fifty-five mills, with 2,600,000 spindles and 50,000 looms, any employing 25,000 operatives being affected. Roughly this was one-third of the country's fine cotton goods capacity. Not affected were the Dartmouth Manufacturing Co., Beacon Manufacturing Co., and the three tire yarn plants of Firestone, Fisk and Goodyear. These five concerns operate 500,000 spindles, and 5,800 looms, and employ 5,000 workers. The strike ended in a compromise.

THE NEW BEDFORD FISHING FLEET

A new industry in New Bedford is a modern, up-to-date fishing fleet which has been developed in recent years. It shows great promise of becoming larger and larger on a profitable basis. Before 1930 it is anticipated that one group alone will have about $500,000 invested in a fleet of boats. Mayor Charles S. Ashley, and others, have been instrumental in encouraging the fishing business locally and have persuaded many owners of boats to adopt new and modern methods, not only in securing their catches, but in distributing their product which has been sent farther and farther into the interior in modern containers that deliver the product in perfect condition. Considering the reputation New Bedford had as a leader in the fishing industry years ago, it is encouraging to note that this new group is operating the business under modern competitive conditions in a way that warrants, over a period of time, a good return on the capital invested.

THE 1927 OUTPUT VALUED AT $126,339,428

In 1927, New Bedford had 209 manufacturing industries. The value of the products manufactured amounted to $126,339,428, to which total cotton goods contributed $94,232,122. The value of cotton goods constituted 74.6 per cent of the total of all products manufactured in the city in 1927. The average number of wage earners employed in manufacturing

in 1927 was 35,086, of whom 29,079 or 82.9 per cent were employed in the production of cotton goods.

The census for 1926 showed the value of products manufactured in New Bedford in that year to have been $121,034,981, or an increase in 1927 over the previous year of $5,304,447.

The total amount paid during the year 1927 to wage earners in New Bedford was $36,421,920, of which amount those employed in the manufacture of cotton goods received $29,471,254, or 80.9 per cent.

THE DIVIDEND RECORD FOR THE TEN YEARS FROM 1919 TO 1928

The average dividend rate on the capital stock of New Bedford cotton mills for ten years from 1919 to 1928, inclusive, was 11.63 per cent per annum.

New Bedford cotton mill dividends, including stock dividends, have averaged per annum for the past ten years:

Acushnet mill, 11.38 per cent; Beacon common, 25.4 per cent; Beacon preferred, 6 per cent; Booth common, 5.40 per cent; Booth preferred, 5.85 per cent; Bristol mill, 9.55 per cent; Butler mill, 7.7 per cent; City Manufacturing Company, 9.45 per cent; Dartmouth common, 24.1 per cent; Dartmouth preferred, 5 per cent; Fairhaven common, 4.3 per cent; Fairhaven preferred, 2.85 per cent; Gosnold common, 4.65 per cent; Gosnold preferred, 3.90 per cent; Grinnell mill, 8.10 per cent; Hathaway mill, 10.55 per cent; Holmes common, 13.55 per cent; Holmes preferred, 6.3 per cent; Kilburn mill, 14.45 per cent; Manomet mill, 10.76 per cent; Nashawena mill, 11.83 per cent; Neild Manufacturing Company, 23.30 per cent; New Bedford Cotton Mills preferred, 6 per cent; Nonquitt Spinning, 14.80 per cent; Pierce Manufacturing Company, 36.10 per cent; Potomska mill, 14.70 per cent; Quissett common, 27 per cent; Quissett preferred, 6 per cent; Soule mill, 18.2 per cent; Sharp mill common, 4.6 per cent; Sharp mill preferred, 3.8 per cent; Taber mill, 11.83 per cent; Wamsutta mills, 12.30 per cent; Whitman mill, 15.8 per cent.

LOCAL MILLS ENJOY GOOD CREDIT

The credit of New Bedford's cotton mill corporations during the past thirty-one years in which they have been engaged in the manufacture of cotton cloths and cotton yarns has been high, while their reputation for producing goods of the highest quality has been steadily maintained. From their latest statements it appears they are, as a whole, in a very strong financial condition, having a surplus of net quick assets of $26,560,153.

Besides the cotton mill corporations, New Bedford has 178 other manufacturing establishments, incorporated and unincorporated, employing about 6,007, whose wages in 1927 amounted to about $7,000,000; stock and material used amounted to $17,684,258, and the value of the products was $32,107,306 that year.

There are now 3,138,856 spindles and 58,243 looms installed in the city's cotton plants.

New Bedford ranks first in the United States in the manufacture of fine cotton goods and fine cotton yarns, and first among the fine goods mill centers in the number of spindles. The plants are steadily increasing the manufacture of silk and rayon goods, about 28 per cent of the output of the mills comprises the finest of silk and rayon mixtures at the present time.

CHAPTER XIII

TAUNTON

WHOSE FURNACES AND RANGES HEAT THE GLOBE

As early as 1652, following the discovery of an abundant supply of iron ore in the flats bordering Two Mile River, in Taunton, an invitation was extended by the inhabitants assembled in town meeting to Henry and James Leonard and Ralph Russell to remove from Braintree, where they were conducting a "bloomerie," and locate in Taunton, but being unsuccessful in inducing them to accept, the local entrepreneurs went forward of their own accord and set up the first local iron works where production was successfully carried on until 1876, the old buildings not being demolished until 1888.

The Whittenton Iron Works, the Chartley Iron Works, another enterprise located on Three Mile River, the Kings Furnace, at East Taunton, the Hopewell Iron Works, John Adams' Iron Works, Cobb's Iron Works, the Old Colony Iron Company, and Baylies' Iron Works, followed the initial venture and in 1809 the latter plant was sold to John West, of Boston, who erected a paper mill, and who, in 1823-24, with Messrs. Crocker & Richmond, built a cotton mill on the site of the old iron works. Paper production was carried on until 1833, the machinery ultimately being removed to the Lincoln paper plant, at North Dighton. The cotton mill finally passed into the hands of the Messrs. Lovering in 1904 and yarn was spun there for their Whittenton Mills.

In 1823 Messrs. Crocker and Richmond built the plant long known as the Brick Mill, where they produced print cloths for the then new calico works, and in 1845 a new unit was built for the manufacture of ginghams. Three years afterward the Dean Cotton and Machine Company capitalized for $100,000 was formed and in 1876 another concern, the Taunton Cotton and Machine Company, with $65,000 capital, took over the old mills, the Park Mill Company succeeding it in 1888.

The first manufactory of cotton goods in Taunton was known as the Green Mill, built in 1806, which was enlarged in 1818, and in 1844 was remodeled into a bleachery, and finally torn down. It was erected by Silas Shepard, a cotton manufacturer, of Wrentham, and in 1824 became a part of the Taunton Mfg. Company's print works. In 1844 it was transformed into a bleachery and was used by the Taunton Paper Company and ultimately demolished. The story of this pioneer cotton textile unit is told at length in the chapter devoted to the early textile enterprises.

A small mill, fifty feet long, two stories high, was built at Barehole Neck in 1812, and became known as the Dean Cotton Mill.

On July 25, 1816, Silas Shepard and John Thorpe of Taunton were granted a patent on an upright power loom, then in operation in the former's woolen mill in that town. On October 14 they received a patent on a socket bobbin winder, then considered the best winding device in use. It is related that when Nathan Appleton was bargaining with Mr. Shepard for the right to use the winders on a large scale, it occurred to Francis C. Lowell and Paul Moody, of the Boston Manufacturing Co.,

that cops could be spun direct from the bobbin, which discovery cut short the negotiations and resulted in the last great improvement in connection with the power loom—that of spinning the filling directly on the cops, without resorting to the process of winding. On March 9, 1816, Mr. Moody was awarded a patent on winding spool yarn.

In January, 1823, the Taunton Manufacturing Company was organized with $200,000 capital in real estate, and $400,000 in personal estate, to engage in cotton, wool and iron production, and the corporation acquired the Whittenton cotton mills, nail works and dwellings, the Brick Mill property, machine shop and dwellings, and the extensive Calico Printing Works, and for several years paid encouraging dividends of 12, 15 and 20 per cent. The calico experiment proved unsuccessful and following the financial depression of 1837, adverse tariffs, and other factors, the last remnant of the Taunton Manufacturing Company was disposed of in the early '40s.

THE WHITTENTON CONCERN IS OVER 100 YEARS OLD

The Whittenton Mills, still one of Taunton's present day industries, were incorporated as a part of the Taunton Mfg. Company's assets in 1823, and in 1836 Willard Lovering, a practical textile manufacturer, became a joint proprietor, and from that year to the present time members of the Lovering family have been prominent in the management. In 1880 the Whittenton Mfg., Company was incorporated with $600,000 capital. In 1910 the property was sold to the Lyman interests and Arthur Lyman is president, Ronald T. Lyman treasurer and Charles F. Allen, secretary.

Capitalized for $2,300,000, the concern employs 1,100 operatives in the Taunton plant. The Boston office is at 50 State Street.

THE BEGINNING OF THE REED & BARTON UNIT

In 1824, Isaac Babbitt and William W. Crossman commenced the manufacture of britannia ware in a small way in Taunton, producing the first articles of this nature ever fabricated in the United States and from that initial attempt came the now world famous Reed & Barton Corporation, the oldest establishment of its kind in this country. Four years afterwards, Henry G. Reed and Charles F. Barton, each then about eighteen years of age, began their apprenticeship, and in 1830 the group organized the Taunton Britannia Manufacturing Company. Five years later Messrs. Reed and Barton associated themselves with Gustavus Leonard and the firm of Leonard, Reed & Barton was formed, the name being changed to Reed & Barton on the death of Mr. Leonard, in 1845. For more than three-quarters of a century the names of these two men have been synonymous with American silverware. In 1889 sterling silverware production was added, and in May, of the previous year, the business was incorporated as the Reed & Barton Corporation, with $600,000 capital.

About 1826 Isaac Babbitt invented the alloy now generally known as Babbitt metal, and first applied Babbitt's metal boxes to railroad cars.

In 1928 came the consolidation of Dominick & Haff, Inc., established in 1821, and controlling the McChesney Company of Newark, N. J., both of these units manufacturing sterling silverware, the merger meaning largely increased activity at the Taunton plant of the Reed & Barton Corporation, which is capitalized for $1,200,000 and employs 750 hands.

Sinclair Weeks is president and treasurer, William F. McChesney and Arthur Ashworth vice presidents, Victor A. George assistant treasurer, and Franklin D. Putnam clerk of the corporation.

About 1825 the first cylinder machine for printing calico was put into operation in Taunton.

THE PRESBREY STOVE LINING COMPANY

The Presbrey Stove Lining Company was established in 1826 by William and Albert Presbrey and incorporated forty years later, with $28,000 capital, since increased to $56,000, and engaged in the manufacture of fire brick and stove linings. Following a disastrous fire, in 1921, the plant was rebuilt and today more than two acres of floor space are used.

Upwards of seventy-five hands are employed, Franklin F. Williams being president and Frederick E. Goff treasurer of the concern.

THE TAUNTON-NEW BEDFORD COPPER CO.

What seem to many people in this second quarter of the twentieth century to be anomalies in the manufacturing life of Massachusetts because the type of products are so far removed from the fields of raw materials find a conspicuous example in a century-old concern—the only one of its kind in the Bay State, and with but few competitors in all New England—the world-famous Taunton-New Bedford Copper Company with general offices in the former city, and plants there, established in Taunton in 1826, and in New Bedford in 1860.

PAUL REVERE—THE AMERICAN PIONEER IN THE ROLLING OF NON-FERROUS METALS

For his dramatic participation in the patriotic efforts that gave birth to the independence of this nation, Paul Revere justly holds a commanding place in American history, but there are few who realize that he won for himself an enduring reputation in the field of Massachusetts industry.

Long after the historic ride on which he carried the patriots' message "through every Middlesex village and farm," Paul Revere was to be found on any business day at his foundry in Lynn Street, Boston.

The silverware he wrought, familiar to those who appreciate beauty of design, is treasured by those versed in antiques, while his specimens of engraving are held in high repute, but it was as the real pioner producer in the rolling of copper on this continent that he made his greatest contribution to the welfare and progress of the youthful Republic. He built up a large and successful business and his products found their way into many famous structures of his era. It was in 1788 that he established his iron foundry, where he cast cannon and ironware, in addition to his work as a gold and silversmith. Later he added non-ferrous metal to his production. In 1792 he cast his first church bell, and only a few years passed before New England churches were almost exclusively supplied with bells made in Paul Revere's foundry.

Conspicuous and historical was his contribution in the non-ferrous metal field, as among the products turned out at his plant were copper and bronze fittings which went into countless ships of the period, including materials for the most famous fighting frigate ever built for the American navy, the *Constitution* or "Old Ironsides."

Paul Revere's study of the melting and working of non-ferrous metals was intense, and he applied his practical experience to the problem with the same tenacity, resourcefulness and thoroughness so characteristic of his whole career. That he possessed confidence in himself and his methods no man can deny when one studies his correspondence. He wrote on July 4, 1799 to Jacob Sharpe, U. S. naval agent at the Ports-

mouth, N. H., yard: "No man but myself in the four New England states can melt the copper and draw it into spikes," and on February 26, 1800, he addressed Hon. Benjamin Stoddard, then secretary of the navy, in these words: "I learned of that gentleman (Colonel Humphries) that there are no persons in either Philadelphia or New York who can make Copper so malleable that it can be drawn in Bolts, Spikes, etc., under the hammer," while the following March 11, he wrote Hon. Harrison Grey Otis, member of Congress, to this effect:

"It is the universal belief of all coppersmiths that no one in this country could make copper so malleable as to hammer it hot. I have further found it is a secret that lay in very few breasts in England. I determined if possible to find the secret and have pleasure to say that after a great many trials and considerable expense I gained it."

The dire need for copper sheets and plates was especially brought to Revere's attention when he furnished copper and bronze fittings for the *Constitution,* but the copper sheets that sheathed the outside of her hull were made in England, because at that time copper had not been rolled in America. However, the sheets were held in place by hand-wrought copper nails made by Revere.

He promptly set to work to acquire complete knowledge of rolling copper into sheets, and drew upon his wide experience in working other metals.

In 1801, Colonel Revere bought the old powder mill at Canton, which, for years, had supplied the Colony and later the Commonwealth of Massachusetts with powder, located on the east branch of the Neponset River, the terrain later becoming a part of the town of Canton. With his son, Joseph Warren Revere, he converted the buildings into a factory producing copper sheets and bars, installing the rolling mill machinery in 1802, most of it probably built locally, but the rollers themselves were secured from Maidenhead, England.

The first sale of rolled copper produced by Paul Revere & Son—a memorable transaction—was made on October 14, 1802, to "Agents for Building the State House," at Boston, and the sheets were employed in covering the dome of the then new executive and legislative headquarters.

When a storm all but wrecked Revere's Lynn Street plant in 1804, the entire business was transferred to Canton.

Early in 1803, the *Constitution* sailed into Boston Harbor for repairs, which included recoppering the frigate, and the Revere mill was awarded the contract for the required metal. The event was signalized by the entry in the ship's log, under date of June 26, 1803: "The carpenters gave nine cheers, which were answered by the seamen and calkers because they had in fourteen days completed coppering the ship with copper made in the States." In 1804-5, Paul Revere sent his son and partner to England, France, Holland, Denmark and Sweden to study the methods of rolling copper then in vogue in these countries, and the younger Revere's notebook which is perused to this day is replete with descriptions and sketches of machinery and operations he observed. The constant improvements made by the firm in the manufacture of copper led to its more extended use in the infant states and closely linked the Reveres with many pioneer efforts.

Robert Fulton's second and third steamboats—the *Raritan* and the *Car of Neptune*—built and launched in 1808, were equipped with heavy copper plates fabricated by the Reveres, which were used in the boilers,

and the business connection between the inventor of the steamboat and Paul Revere & Son continued uninterruptedly until Fulton's untimely death, in 1815. The Revere metal entered into the *Fulton the First*, the initial steam war frigate, built in 1815, and also into the first torpedo boat. Paul Revere continued his active participation in the affairs of the firm up to within a few years of his death, in 1818, and in his will directed that his son should remain in control and management of the copper mill and all other properties in which the father had been interested.

In 1828 the Revere Copper concern was incorporated and upon the death of Joseph Warren Revere, the latter's son, John, succeeded to the properties and responsibilities, and continued the activities of the Revere Copper Company. When John Revere died in 1886, his son, Edward H. R. Revere, who had been associated in the business, continued the name of the Revere Copper Company until 1900, when the unit was consolidated with the Taunton Copper Manufacturing Company, which had been established in 1826, and the New Bedford Copper Company, which had been formed in 1860, and the new corporate unit adopted the name of Taunton-New Bedford Copper Company, by which cognomen it is known today.

Subsequently, Edward H. R. Revere became vice president of the consolidated organization, which unified the long experience and unrivaled craftsmanship of the three pioneer organizations in the art of rolling non-ferrous metals, and in 1927, following the death of Henry F. Bassett, who for forty-three years had been president of the merged corporation, Mr. Revere, great-grandson of Paul Revere, succeeded to the presidency, thus continuing the sequence from father to son from 1788 to the present day.

The Canton plant, which in time became the mills of the Revere Copper Company, was operated for a century, lacking one year.

When the merger of the Taunton and New Bedford units was effected there was created an organization operating two completely equipped plants, covering a total area of some fifteen acres in Taunton and New Bedford, and having a normal capacity of at least 3,000,000 pounds of copper products a month.

Copper has been worked by artificers throughout the ages. Ever since the forgotten centuries long before the Christian era, man has used the everlasting metal, which antedates our civilization itself.

No one can justly claim distinction as a pioneer in so old an industry as copper working. The Taunton-New Bedford Copper Company, however, in 1926 rounded out an unbroken century of activity in this industry, despite the fact that up to the present no copper mine has been discovered on the soil of Massachusetts, where the type of metal mined warranted a financial investment that offered hope of pecuniary reward.

The beginnings of the Taunton-New Bedford Copper Company also run back to a little rolling mill established in the Bristol County town of Norton, in 1826, by the firm of Crocker Brothers, composed of William A., Samuel L., and George A. Crocker. Five years later the enterprise was incorporated under the name of the Taunton Copper Manufacturing Company.

Three-quarters of a century later, the Taunton Copper Manufacturing Company, in order to enlarge its capacity, consolidated with the Revere

Copper Company and the New Bedford Copper Company—concerns with like reputations for the manufacture of the highest grade of copper products over a long period of years.

THE CONCERN ONCE OPERATED A SMELTER, IN TAUNTON

Copper was not mined in America on a commercial basis until after the Civil War, and for many years prior to that time the metal that was rolled in the Taunton plant was extracted from ores which came chiefly from Chile.

The Taunton Copper Manufacturing Company maintained a smelter in Taunton before the expansion of the city made it necessary to remove that part of the establishment on account of the fumes it emitted. The island of Rhode Island afforded a suitable location, and the smelter was operated there until 1884.

Thereafter, pure copper was obtainable from the large producing companies, and the company abandoned smelting on its own account.

The old bronze bell at the Taunton plant now and then provokes inquiries from curious visitors to the city. Long ago it was cast for use in a church in New Orleans, and for many years it summoned worshippers to the sanctuary in the picturesque Creole City.

When General Butler's troops occupied New Orleans in Civil War days, copper was in great demand, and the bells in the churches were taken down and sent north. Some of them were purchased for re-melting at the Taunton works, but one escaped the scrap pile and was mounted in the belfry. It sounded, and still sounds, the hours for starting work, for quitting, and for the noon hour.

As early as 1826 the first small mill at Norton began rolling copper, and later brass and bronze and while little science attended the operations, a heap of craftmanship entered into the product during those early years. Even then "quality first" was the watchword of these entrepreneurs who taught their employees to produce good metal upon which the reputation of the company was built. Today, the competitors of the concern find the combination of Massachusetts craftsmanship, plus science, hard to beat.

Although a relatively small unit in its line, it has been unusually prosperous for a great many years, and one of the secrets of its success, apart from the soundness and up-to-the-minute methods of its management, lies largely in the fact that it produces a large number of specialties in which it does not enter into direct competition with the larger units in that field.

The company has never issued an income account, but its ability to earn and maintain for years at least a six per cent dividend on its stock, of which at present there are 120,000 shares of $100 par outstanding, not to mention the unusual soundness of its financial condition as revealed by recent balance sheets, is ample evidence of its strength and position in its line. It maintains branch sales offices and warehouses in New York City and Boston, but the main office is at 267 West Water Street, in Taunton. At its two plants it carries upwards of 700 men on the payrolls.

In 1928 it became one of the units embraced in a merger known as the Republic Brass Corporation, but the names of the original companies were not changed, nor was the executive personnel affected by the consolidation. Edward H. R. Revere is president, Nathan Newbury, vice president, Everett B. Davenport, treasurer, T. Wilson Sherman, assistant treasurer, and Francis J. Bassett, agent.

THE BEGINNING OF TAUNTON'S TACK INDUSTRY

In 1827, Albert Field began the manufacture of brads, in Taunton, utilizing a machine which he designed and built. Three years later he purchased one of Jesse Reed's tack machines, and as his business grew he designed and was the first manufacturer of what became known in the trade as the gimp tack, used in fastening linings on carriages and furniture. So successful was he in this field that he soon drove out of the American market the English clout nails, by producing a much superior product for the same purposes, and at a lower cost. Improving the machinery in his plant by adding ingenious inventions which he worked out, he early broadened the markets of his products and sold customers in Germany, Africa, China, South America, Australia and the West Indies.

He became interested in other local industrial enterprises and established the Taunton Foundry & Machine Co., and the Mount Hope Iron Co., at Somerset. The A. Field & Sons' Nail and Tack Works eventually became the largest unit of its kind in the country, and in 1891 became a part of the Atlas Tack Corporation, of Fairhaven.

THE OAKLAND MILLS

In 1827 Elias Strange founded Strange's Machine Works, and the following year, the Oakland Mills, a stone factory, 116 feet long, was built by Silas Shepard, formerly of Wrentham, and at first cotton yarn was spun, but in 1831 looms were added. In the intervening years the plant has been greatly extended, large additions being erected by the original owner, while in 1880 two new buildings were constructed, doubling the productive capacity.

THE GENESIS OF THE MASON MACHINE WORKS CO.

The progenitor of the Mason Machine Works Company, was the William Mason & Company's Machine and Locomotive Works, the founder of which was William Mason. He belonged to that class of self-made men



WILLIAM MASON
of Taunton
Founder of William
Mason's Machine Works,
of that city, today the
Mason Machine Works
Company

who attain a prominent position while yet in the noon of manhood, and in spite of early disadvantages, Mason became one of the great mechanical geniuses of Massachusetts. After a boyhood spent successively in the blacksmith shop, the cotton mill and the machine shop he was found, in 1829, when twenty-one years of age, in Canterbury, Conn., constructing

and setting up power looms for the manufacture of diaper linen, believed to have been the first adapted to this kind of production in the world; subsequently, in Killingly, Conn., manufacturing a new type of "ring travelers," on ring frames, which later came to occupy a high place in frame spinning, and at a later period in Taunton, where, after many bitter disappointments and crushing reverses caused by the failures of others, he found the theater of his future triumphs. Here, on May 4, 1838, he received a patent on a spinning machine, which bears a striking resemblance to the spinning frames of the present day.

It was in Taunton, too, while acting as foreman for Crocker & Richmond, a local firm of machinists, that he perfected the greatest invention of his career—the "self-acting mule" for spinning cotton, and other fabrics—and upon which he obtained patents in 1846. It was in Taunton, in 1842, after Crocker & Richmond had failed, that Mason, through friendly assistance became the principal owner and manager of the works. The prosperous times succeeding the enactment of the tariff of 1842 and the confidence of cotton and other manufacturers in his mechanical abilities at once established a business, which, in a very few years, enabled him to erect, after his own design, the buildings now occupied by the Mason Machine Works.

At the time they were constructed they were said to have been the largest ever erected in the United States for the sole manufacture of machinery. They were subsequently enlarged to facilitate the building of locomotives. As early as 1855 the Mason concern employed 600 hands in the manufacture of locomotives, railroad machinery, machinists tools, blowers, cupola furnaces, gearing, shafting, and all kinds of cotton and woolen machinery.

In 1861, the company accepted a contract to furnish 100,000 Springfield rifles to the United States Government, which, subsequently, was reduced to 30,000.

In 1879 the production of the Campbell printing press was begun at the plant.

The concern today is capitalized for $1,000,000, employs from 700 to 1,000 workers, and builds cotton mill machinery. Albert R. White is president and Harry W. Fay treasurer and secretary.

In 1837 J. C. Sproat began the production of wooden boxes and nail casks.

THE OSCAR G. THOMAS COMPANY

The factory of the Oscar G. Thomas Company stands on the site of land bought for iron-working purposes by John H. Eddy, in 1843. The foundry is the oldest unit of its kind in Taunton, having been established in the eighteenth century by Messrs. Crocker and Richmond. After several changes in ownership, Samson Perkins became the proprietor of the enterprise, and after his death, in 1873, it passed into the hands of Oscar G. Thomas.

Accessions to the property were made in 1855 and 1861 and in 1911 the Thomas Company was incorporated, and later absorbed the Union Foundry and the Bridgeport Crucible Company's plant.

Capitalized for $50,000 and employing 100, the concern manufactures ranges and heating stoves, H. W. Thomas being president, Robert W. Whitmarsh treasurer and L. G. Thomas secretary.

In 1845 Lemuel Leonard built a small foundry on Mill River, for casting stoves and small hollow ware, later taking into partnership his son,

Lemuel M. Leonard. Following the latter's death, in 1876, the Leonard Co-operative Foundry Company was organized in 1877, with $25,000 capital, being succeeded in 1890 by the New England Stove Company, now the Leonard & Hamilton Foundry Co., capitalized for $50,000, manufacturing stoves and ranges, and employing twenty-five operatives. C. J. Hamilton is president and C. N. Leonard treasurer.

In 1846 John R. Williams began at Weir Village, on the banks of the Taunton River, the business which, since 1890, has been known as the Williams Stove Lining Company, now capitalized for $50,000, and employing fifty operatives in the manufacture of stove linings and polish. Joseph S. Williams is president, and John G. Williams treasurer of the corporation.

THE TAUNTON LOCOMOTIVE MFG. CO.

The Taunton Locomotive Manufacturing Company was incorporated in January, 1847, with capital of $50,000 which was subsequently increased to $125,000. It built some of the fastest locomotives used on the Hudson Railroad, which, at that period, had the reputation of being the fastest line of travel in the United States.

With one exception, the Taunton concern was the first establishment set up in New England for the carrying on of locomotive construction. The first railroad engine that operated west of the Mississippi, on the Pacific Railroad, was built at the Taunton Works. W. W. Fairbanks was the agent of the company from its inception, having previously been engaged in the manufacture of stationary and marine engines in Providence, R. I., where he began production in 1828.

The Taunton plant was located adjacent to the depot of the New Bedford and Taunton Branch Railroad Company. Coal burning locomotives were made there at a time when most locomotive concerns were turning out the old wood-burning models.

Railroad cars and machinery were also produced, and in 1883, the manufacture of Huber printing presses was begun at the plant.

In 1848, Eldridge & Co. began the manufacture of white metal and silver plated products.

The Taunton Oil Cloth Company was incorporated in 1850, with $25,000 capital, to manufacture enameled and pebbled oil cloth, and still carries on the business, the concern being capitalized for $100,000, and employs 100 operatives, maintaining a New York office, at 350 Broadway.

Roger Sherman is president, and Richard C. Proctor, treasurer.

In 1851 the Phoenix Manufacturing Co. was incorporated for the manufacture of crucibles.

The Taunton Tack Company, formed in 1854, was absorbed by the Atlas Tack Corporation, in 1891.

The Taunton Iron Works were organized and incorporated in 1854 by Enoch King, of Raynham and William L. Hathaway, of North Dighton, and, in 1889, Capt. William H. Phillips purchased the company's assets.

The Taunton Stone & Earthen Ware Pottery was also founded in the '50s, and the Webster Fire Works, established by Joseph Webster, came into being during the decade between 1850 and 1860.

LOCAL INDUSTRIAL STATISTICS OF 1860

In 1860 tacks, brads and horse-shoe nails manufactured by the Taunton Tack Company, A. Field & Sons, and Lovett Morse, were valued at $370,000; screws, made by the Bay State Company, which employed 220

hands, and was capitalized at $175,000, were valued at $150,000; stove and other castings made by Eddy & Co., the Foundry & Machine Co., Lemuel M. Leonard, Bartlett and Potter, and the Taunton Iron Works Co., employing altogether a capital of $190,000, and 383 men, were valued at $340,000. The Taunton Locomotive Co. employed 250 operatives, in 1860, and by that year had turned out 300 locomotives since its formation. In 1860, Taunton's cotton mills, producing cloth and flannels, employed 248 males and 438 females, and produced fabrics valued at $632,000, while the only local woolen mill, employing seventy hands, manufactured that year cassimeres valued at $110,000. Enameled cloth and car linings were produced by three plants, the product being valued at upwards of $200,000.

The total value of all manufactured commodities produced in Taunton, in 1860, was $1,910,902, nearly a third of which amount was in copper, yellow metal, and zinc, made by the Taunton Copper Manufacturing Company, now the Taunton-New Bedford Copper Company.

John Magee, the founder of the Magee Furnace Company, first established his business at Lawrence, and in 1856 located at Norton, becoming a member of the firm comprising the Norton Furnace Company in 1860, but later withdrawing to establish the Magee Furnace Company. For many years the company's foundry was located at Chelsea, the concern finally selling that property to the Texas Oil Company and locating at Taunton, within four and a half miles of the original manufacturing plant, and later building a new foundry at Weir Village, Taunton, for the manufacture of gas ranges. The concern now carries on operations in Rochester, N. Y., but the foundry work is executed in Taunton. The corporation has capital of $500,000 and employs 450 operatives. Alfred E. Stockbridge is president and treasurer and Robert P. Burton, is vice president and secretary.

INDUSTRIES FORMED IN THE SIXTIES AND SEVENTIES

In 1860 the Eagle Cotton Mill Company was incorporated with $60,000 capital and in 1861 M. M. Rhodes & Son Company was formed to manufacture hoop-skirt trimmings, later producing papier-mache shoe buttons, being the first concern in America to undertake the manufacture of these commodities through the medium of this type of raw material. Upholstery buttons and shoe laces later represented the production of the company.

Today, shoe findings constitute the company's products. The concern is capitalized for $50,000, and employs forty operatives. Ralph E. Barker is president and Marcus A. Rhodes is secretary and treasurer.

The Taunton Stove Lining Co. was established in 1864, by Messrs. A. W. and W. N. Parker, and the same year, Messrs. Anthony and Cushman began the manufacture at Weir Village of shoe nails and tacks, removing in 1882 to the plant formerly occupied by the Bay State Screw Works.

On July 6, 1866, the North Dighton Coöperative Stove Co. was formed, in the village of North Dighton, becoming the North Dighton Stove Co., when incorporated, in 1917, with $40,000 capital. The plant was removed to Taunton where sixty operatives are employed in manufacturing stoves, Henry H. Lincoln being president, John H. Crotty treasurer and Thomas P. Williams secretary.

The manufacture of brick was begun in 1868, by the Taunton Brick Company, capitalized at $75,000.

In 1870 Messrs. French & Winslow formed a partnership for the manufacture of fire brick and stove linings.

In 1872, the Taunton Cotton & Machine Company, capitalized for $65,000, commenced operations and in 1882 was succeeded by the Park Mill Co.

In 1874 the Cohannet Mills were formed with $100,000 capital and a brick mill was erected 330 feet by 50 feet, two stories in height, the capitalization being increased to $200,000 in 1881 when a second mill, 365 by 72 feet, three stories high, was added. In 1890, the third unit 429 by 107 feet, three stories high, was built at Weir Village, and the capital was increased to $600,000.

In 1875, the Canoe River Mills were established for the weaving and knitting of cotton textiles, the promoters operating at that period a second unit, at North Scituate.

In 1877, the Eilzabeth Poole Mills, 218 by 70 feet, two stories high and a second unit 140 by 50 feet, were built and later two units 119 by 70 and 155 by 48 feet, each one story high, were added, the capital being fixed at $100,000. The concern was named in honor of an English woman who patronized and assisted the early settlers of Taunton. In 1910 the mills were reorganized under the name of the Old Colony Manufacturing Corporation, with $60,000 capital, the equipment including forty-four cards, fifty-six broad looms, 10,032 spindles and three boilers. Cotton yarns and cloth are produced at the plant, 125 hands being employed. Arthur C. Staples is president, Henry H. Culver treasurer and Walter A. Merrill secretary of the corporation.

THE GLENWOOD RANGE COMPANY

Taunton is famous for its ranges and the reason is not difficult to fathom. In parts of the United States which are included in the more recent settlements one frequently hears of mushroom growths in industry. Factories are built almost over night, and the building of the town follows the factory. But in New England are found the traditions that characterize the old England, and when the seeker of facts observes a city noted for some particular type of production he usually discovers that it has long been famous as the center of that industry.

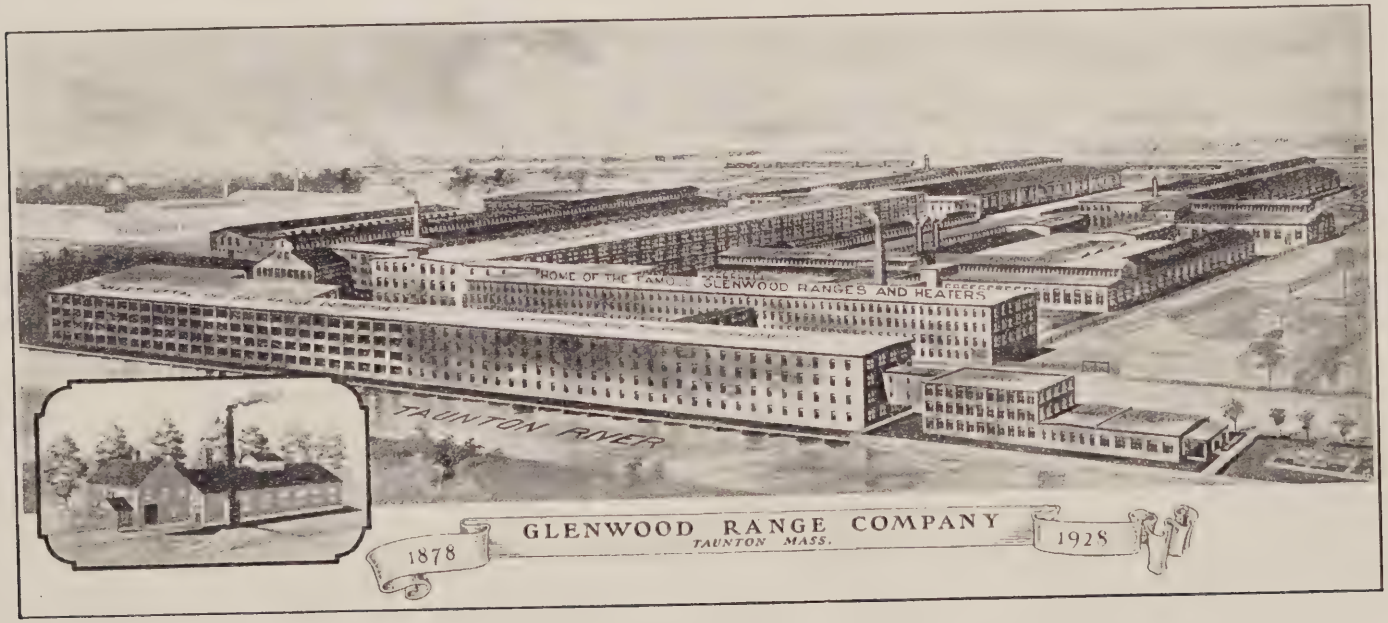
So it is in the case of Taunton, which is renowned for its big stove industry today because it was known for its production of these household necessities when both the industry and the town were smaller.

For more than 100 years the municipality has been the center of moulding castings and the craft of moulding, casting and assembling ranges has been handed down from father to son, and from generation to generation.

In 1879, in a Taunton barn, three young men—one a designer and pattern-maker, another a foundry boss and the third, a skilled moulder—all turned carpenter to add a shed to the barn in order to accommodate their melting furnace.

Their output, judged by modern standards of production, was ridiculous—four ranges a day. But, they were good products—that was the important point. They firmly believed that quality was the basic element of success, to be followed by adequate publicity in order to acquaint the world with their product.

Charles F. Baker, William F. Walker and George E. Wilbur laid the foundations of the present-day Glenwood Range Company, formerly known as the Weir Stove Company, and from the small, plain and simply


HOME OF THE FAMOUS GLENWOOD RANGES AND HEATERS
TAUNTON RIVER
1878
GLENWOOD RANGE COMPANY
TAUNTON MASS.
1928

made stove of the last century produced in that Taunton barn, has been evolved the up-to-date models fabricated in the extensive set of new buildings constructed in 1902 to which are brought annually thousands of tons of pig-iron from Buffalo and the Great Lakes ports, as well as from the Pittsburgh district, to fill the capacious maws of the furnaces and cupolas at the plant, some of which have a capacity of twenty-five tons. The buildings now in use cover an area of nine and a half acres and aside from a factory in Detroit, Mich., there is no other plant in the United States that has so large a capacity for stove production.

In contrast with that first output of four ranges a day, at the present time a Glenwood Range is cast, set up and shipped every two minutes. In a single generation, the business has increased 5,000 per cent, which figures scarcely spell a decline.

Some years before the founders of the Glenwood Range Company died, they realized that for any organization to carry on and have a survival value, young men must be trained to succeed those who wished to retire, or who had passed out of the industrial picture.

The present management consists of Joseph L. Anthony, president, in charge of manufacturing; Hon. Robert M. Leach, treasurer, and a former representative in Congress, in charge of the financial end; and Merle E. Abbott in charge of sales and advertising, all of whom have contributed much to the success of the company during the past twenty-odd years.

The concern is capitalized for $3,600,000 and employs upwards of 1,000 workers.

The New Process Twist Drill Co. was incorporated in 1881, succeeding a partnership established in 1874, with capital of $15,000, and today employs 200 hands in the manufacture of twist drills, T. Edward Hatch being president, Col. Peter H. Corr, treasurer, and James P. Corr, secretary. The concern is one of the oldest manufacturers of twist drills in the United States, having produced continuously under the original basic patents for upwards of forty years, selling direct to railroads, industrial plants and supply houses, as well as exporting much of its product abroad.

THE WHITE-WARNER COMPANY

In March, 1882, Charles P. White and George L. Walker established a small foundry and began the manufacture of stoves, Richard E. Warner being admitted to the firm in 1883, the concern becoming known as White, Walker & Company. Three years later Mr. Walker retired and the present-day White, Warner Company came into being although not incorporated until 1897. Two disastrous fires, which all but wiped out the plant, had no adverse effect upon the company's fortunes and today the Household and Quaker Ranges are known throughout the civilized world.

With capital of $300,000, the concern employs 175 operatives. Hon. Joseph E. Warner, the present attorney general of the Commonwealth, is president; Hon. Richard E. Warner, for many years chairman of the board of county commissioners of Bristol County, is treasurer; and Henry E. Wilbur is secretary of the corporation.

In 1882, Horatio L. Cushman & Company began the manufacture of shoe buttons, fabricated from papier-mache.

Messrs. G. A. Lincoln, E. N. Goff and Nathan W. Welch established the Union Stove Lining Company the same year.

THE EVANS STAMPING AND PLATING CO.

About 1884 the Paragon Gear Works were established at Weir Village, and later removed to the plant formerly occupied by the H. A. Williams Mfg. Co., and in 1902 the business was incorporated as the Evans Stamping and Plating Co. In 1907 the manufacture of the Paragon Reverse Gear was begun and on account of the great demand for this product the company has manufactured no other line for many years, the transmissions being constructed for all sizes of marine motors to the 200 pound Diesel type and the 400 to 500 horse-power high-speed racing motors. Today the factory is the largest in the world devoting its production exclusively to this type of commodity.

Capitalized for $150,000, the Evans concern employs 75 to 100 operatives. R. Wastcoat is president and treasurer and Paul D. Dean secretary.

In 1885 the firm of Charles Hewitt & Co. was formed for the manufacture of shoes.

In 1887 the West Silver Co. purchased the plant of the F. B. Rogers Silver Co.

In 1889 the S. A. Wilde Mfg. Co. was established to manufacture tin ware, and the following year the Dighton Rock Pants Co. was formed.

In 1890 the Nemasket Mills were organized to spin cotton and woolen yarns and ten years later were sold to the New England Cotton Yarn Company. The original plant was 400 feet long and three stories in height.

In 1891 the Atlas Tack Corporation absorbed the Albert Field & Sons Tack Company, the Taunton Tack Company, the American Tack Company, the Plymouth Tack Company and the Island Creek Tack Company and the identity of such tack producing units as had long operated in Taunton passed out of the local industrial picture.

THE POOLE SILVER COMPANY

The present Poole Silver Company was formed in 1892 by George Poole and Edward F. Roche, beginning operations in a small way in a shop 35 by 20 feet, in May of that year.

The business grew rapidly and in 1894 a larger shop was built, approximately 50 by 30 feet, two stories in height. Previous to 1895 the concern was known as Poole, Roche & Co., but in 1895 it was incorporated as The Poole Silver Company, and today is capitalized for $110,000.

In 1899 the present shop occupied by it, 100 by 50 feet, three floors in height, of brick mill construction, was erected, and from 1910 up to the present additions have been made until the factory is 150 feet long by 50 feet wide, with shipping room 100 by 50 feet, four stories in height.

The company manufactures high grade silver tableware, plated both upon nickel silver, or hard metal base, and white metal, or britannia base, comprising such utility articles as tea and coffee sets, meat platters, vegetable dishes, water pitchers, serving trays, etc., together with a line of trophy cups and pewter ware.

During the last few years upon the revival of pewter, the company has entered into that type of production quite extensively.

The officers are M. L. Poole, president; A. E. Poole, secretary and treasurer; board of directors, M. L. Poole, A. E. Poole and H. M. Poole, and the company's sales approximate $400,000 a year.

The plant is operated by electric power, with individual sectional motors and employs upwards of 100 operatives.

The Taunton Dye Works and Bleachery Company was incorporated in 1893, with $84,000 capital, and is engaged in dyeing raw and carded cotton. It employs sixty-five operatives, Fred H. Gooch is president, William M. Lovering treasurer and George W. Read secretary.

The Corr Manufacturing Company at East Taunton was incorporated in 1895 and the production of cotton cloth and yarn was begun the following year, with about 40,000 spindles and 1,000 looms, the totals being later increased to 64,800 and 1,260.

In 1897 The Alkalol Company was established and was incorporated in 1909, engaging in the preparation of proprietary medicines. The concern employs twenty-five hands, Merle T. Barker is president and James P. Whitters treasurer and general manager.

In 1899 Amos A. Fisher began the manufacture of novelty and fancy goods and tableware in aluminum under the name of the Taunton Aluminum Novelty Company.

In 1899 the Winthrop Cotton Yarn Company was formed with $300,000 capital, to manufacture cotton yarns. Frank L. Cady is president, Abbott F. Lawrence treasurer and C. Harland Lawrence secretary. The plant is equipped with forty-six cards, twenty combs, 4,224 ring and 7,776 mule spindles, three boilers, and employs 100 operatives.

LOCAL INDUSTRIES FORMED THIS CENTURY

In 1902 the Taunton Wool Stock Company was incorporated with $21,000 capital, since increased to $61,000, and employs fifty hands in fabricating wool substitutes, William A. Nickolds, being president and secretary, and William M. Lovering treasurer.

The same year the E. A. Fargo Company was established to manufacture aluminum products, and is now known as the Fargo Aluminum Company, upwards of fifty employees producing high grade aluminum goods. William H. Cushman is president and treasurer and Frank B. Mason, secretary.

In 1903 the Hughes Eyelet Company was established to manufacture shoe eyelets and metal specialties. Two years later the plant was destroyed by fire, but was immediately rebuilt, the manufacture of shoe eyelets being carried on for the next ten years, when the concern entered the field of special and fancy eyelets and added small metal stampings for the electrical trade.

The concern is a branch of J. C. Rhodes & Co., of New Bedford, is capitalized for $93,000 and employs thirty-five hands, William Hughes being the assistant treasurer and general manager, and W. G. Hughes is assistant general manager.

The Etna Company was incorporated in 1903 to manufacture twist drills, having been established in 1897 as a partnership. It is capitalized for $65,000 and employs upwards of fifty men in producing drills. William F. Congdon being president and Chester S. Godfrey treasurer and secretary.

In 1903 the Cohannet Silver Company was started as a britannia and silver-plating unit.

In 1905 the Taunton Knitting Company was formed and is constantly enlarging its operations.

In less than a quarter of a century it has grown from a small knit underwear unit to one employing upwards of 150 operatives, is capitalized for $300,000, and maintains a Boston office, at 99 Chauncey Street. Franklin A. Williams is president and Charles R. Hodges treasurer. In 1928 it

acquired the Sterling Knit Goods Co., of Newton, and transferred the equipment of that concern to Taunton.

In 1906 the Taunton River Mills began operations under the name of the D. G. Dery Corporation, as manufacturers of broad silks.

In 1907 E. D. Paige and James M. Westgate formed what today is known as the Bay State Crucible Company importing from India, Africa and Germany practically all the raw materials entering into its large line, being the only concern in Massachusetts, and one of two in New England, manufacturing graphite crucibles.

The company has capital of $50,000, Franklin D. Williams is president, and James M. Westgate, treasurer and secretary.

In 1907 the Taunton Pearl Works was incorporated, with $100,000 capital and has become a most successful concern devoting its production to men's jewelry and now employing upwards of 150 operatives. Albert A. Ormsbee is president and secretary, and Willard A. Ormsbee treasurer of this fast growing enterprise.

The Taunton Rivet Works were incorporated in 1908, with $20,000 capital, since increased to $30,000, and today employs thirty-five workers in manufacturing rivets, burrs, and slotting cutters. William J. Davison is president and treasurer.

In 1908, the Atlas Buckram Co. was incorporated, with original capital of $58,800, since increased to $176,400, and produces cotton and burlap buckrams, operating its own dyeing, bleaching and finishing departments, and employing fifty-five operatives. Alonzo H. Shumway is president, treasurer and secretary of the corporation.

In 1908 the Leonard & Baker Stove Company was established, and a reorganization of the concern was effected in 1921, the company having taken over the previous year the patterns and business of the Somerset Stove Foundry Company, acquiring the right to the name Glendale, as applied to ranges and heaters, adding this line to the Fairmount range which, from the beginning of the Leonard & Baker unit, had been manufactured.

Capitalized for $53,000, the concern employs upwards of 150 workers. Charles H. Macomber is president, Alfred W. Tallman vice president, Eugene L. Baker treasurer and L. L. Lincoln assistant treasurer.

In 1912 the Taunton Silk Fibre Company was incorporated, with $30,000 capital and now employs fifty operatives in manufacturing garnetted silk. William E. Emery is president, and George W. Read is treasurer and secretary.

The Taunton Rubber Company was incorporated in 1913, with $42,500 capital, since increased to $180,000 and now employs 125 operatives in the production of rubber heels and specialties, H. O. Phillips being president, Joseph L. Gifford treasurer and secretary and M. J. McClellan assistant treasurer.

The following year, the Taunton Cotton Mills Company was incorporated to manufacture cotton goods, and the concern today employs upwards of 500 operatives, in the production of auto tire yarn, at its East Taunton plant, Obadiah Butler being president and V. T. Anderson, treasurer.

The same year, the New England Brass Company was organized, with $75,000 capital, since increased to $120,000, and produces brass, nickel, silver, bronze, and phospher bronze, N. Newbury being president, Frederick H. Gooch treasurer and Henry F. Nickerson secretary of the concern.

In 1917 the Cohannet Vulcanizing Company was established, with $1,000,000 capital, and the same year, the Nobska Spinning Co. was incorporated.

The Taunton Hosiery Company was incorporated, in 1918, with $100,000 capital, and the next year the Fabric Weaving Company was established with $50,000 capital, to manufacture marquisette cloth, William R. Pepler being president and William S. Pepler treasurer of the concern.

Brownell & Burt, Inc., was established in 1919, with $15,000 capital, to engage in the production of automobile bodies, thirty-five employees being carried on the rolls. D. L. Brownell is president, George H. Burt treasurer and E. H. Brownell secretary of the concern.

The Manhasset Manufacturing Company received a charter the same year, and the Hodgman Manufacturing Company was formed in 1919, becoming a partnership the following year, with W. K. Hodgman, Sr., and W. K. Hodgman, Jr., as members of the firm, engaging in the manufacture of automatic sprinklers.

In 1920 the Ever Sharp File Company was formed and was incorporated three years later, with $24,000 capital, and is engaged in the manufacture of files and rasps, Elihu G. Sibley being president, and Charles S. McNulty treasurer and secretary of the concern.

In 1922 the Chandler Oil Cloth & Buckram Company was established, with $150,000 capital, and employs 150 operatives, in the manufacture of oil cloth and yarns, Edward J. O'Brien being president, Thompson Newbury treasurer and Howard W. Brown, secretary.

The plant of The Stiles & Hart Brick Company employs 100 operatives and has a capacity of 10,000,000 brick annually. H. B. H. Hurd is president, David B. Andrews vice president, and Henry W. Redfield, treasurer and secretary.

TAUNTON'S INDUSTRIES ARE DIVERSE IN THEIR PRODUCTS

The Absorbent Linen Co., capitalized for $100,000, employs fifty operatives in the manufacture of linen products, James Norrie being president, Harold F. Lewis vice president, and D. B. Lewis treasurer.

The Bay State Tap & Die Co., whose main plant is in Mansfield, operates a unit in Taunton, where twist drills are fabricated.

Henry J. Collis, the designer and inventor of Athletic sporting shoes, operates the H. J. Collis Athletic Shoe Co., and constantly employs between 75 and 100 workers in the production of this type of footwear.

Col. Peter H. Corr operates a cotton waste mill under his own name.

The Decorative Metal Co., Inc., capitalized for $50,000, employs thirty-five operatives in the manufacture of metal products, Elihu G. Sibley being president and Charles S. McNulty treasurer and secretary.

The Eaton Electric Furnace Co., with capital of $50,200, employs thirty-five hands in producing electric furnaces, John E. Winter being president, Murray Winter, treasurer, and Edwin S. Hope, secretary.

The Karded Products Co. was incorporated in 1924, with $100,000 capital and produces carded cotton yarns, H. G. Mitchell being president and treasurer; and the Metalcrafts Co. employs thirty operatives in the manufacture of silver-plated hollow ware, Everett Bellamy being president, Joseph Cohen, treasurer, and Lester Cohen, secretary.

The Morris Shoe Co., owned by W. E. Morris, is engaged in the production of men's and boys' shoes.

A concern that has had a phenomenal and rapid growth is Morse, Driscoll, Hunt & Co., Inc., which now employs 200 operatives in the man-

ufacture of curtains and drapery fabrics. It is capitalized for $250,000, Edward J. Morse is president, William J. Driscoll, treasurer, James V. Hunt, and Stuart Robertson, vice presidents, Ormond F. Leonard, assistant treasurer and Stuart E. Waterfield, secretary.

The Perkins Company, owned by Eben and M. A. Perkins, employs twenty-five operatives in its brass foundry and finishing establishment.

Perry H. White is the owner of the Perry Chemical & Color Co., which specializes in heavy chemicals and acids.

The Robertson & Brabrook Mfg. Co., capitalized for $46,000, manufactures stove bolts and machine screws, John D. Robertson being president and treasurer, Leonard M. Brabrook, vice president, and Charles J. Robertson, secretary.

The F. B. Rogers Silver Co., an old established Taunton concern, capitalized for $30,000, employs forty hands in the manufacture of silver-plated hollow ware, Carlton A. Woodward being president, William J. Davison, treasurer, and Joseph S. Paine, secretary.

The Sachs-Karon Co., of which N. H. Sachs is president, A. S. Sachs, vice president, Harry Karon, treasurer, and Philip Stone, secretary, employs fifty hands in the manufacture of dresses and skirts.

The Sherwood Curtain Co., Inc., with capital of $25,000, manufactures novelty curtains, William C. Baker being president and treasurer, and Sherwood J. Baker, secretary of the concern.

The Standard Stove Lining Co. employs fifty operatives and has capital of $50,000, being engaged in the production of stove linings and fire brick, Hon. Richard E. Warner being president, Hon. Robert M. Leach, treasurer, and George E. Hunt, secretary of the corporation.

The Taunton Weaving Co., incorporated in 1924, with capital of $100,000, employs 150 operatives in the manufacture of broad silks and cotton and silk mixed goods, A. Rosen being president, M. Rosen, treasurer, and H. Rosen, secretary.

The Ullian & Karon Co., with capital of $54,000, operates a factory in Taunton, the headquarters of the concern being in Boston.

The Frank W. Whitcher Co., capitalized for $250,000, employs seventy-five operatives in producing shoe lacings and findings, Frank W. Whitcher being president, S. R. Nichols, vice president and secretary, and Frederick R. Le Gallee, treasurer.

The White Silver Co., of which William P. White is president, William McIsaac, vice president, Louis J. Antine, treasurer, and Jacob Goldstein, secretary, employs thirty-five, in the manufacture of silver plated hollow ware.

In 1927 Noyes-Perkins & Co., Inc., was incorporated with $30,000 capital, and took over the Manhasset Mill, where garnetted silk and wool blends are produced. H. B. Noyes is president and treasurer, and E. B. Noyes, vice president. The concern employs fifty hands.

In 1928, the Pepler Weaving Co. was incorporated, with a capital of $25,000, to manufacture, import, export and deal in woolen and worsted goods and other fabrics.

The Connecticut Mills Co. now operates the Taunton Cotton Mills, and produces tire yarns, the local unit, which is a branch of the Danielson, Conn., plant, being equipped with 33,792 spindles.

There are also in Taunton a branch unit of the Butler Mills, of New Bedford; a plant of the City Mfg. Corporation of New Bedford, producing silk, rayon and cotton fabrics, equipped with 600 looms, while the Taber

Mill, of New Bedford, has a local unit where plain and fancy cotton goods are produced.

In 1927, the 106 manufacturing enterprises of Taunton turned out products valued at $30,643,231, and employed 6,154 wage earners to whom were paid $6,989,318, of the total number of employees 1,112 were workers in the stove and hot-air furnace concerns of the city, a total some 300 greater than these companies employed in 1921. The eleven cotton goods concerns in the city carried an average of 1,943 employees on their payrolls, in 1927.

That Taunton is a city of diversified industries is apparent when one scans the statistics as fifty-two of the 106 local industries, classed in the miscellaneous list, produced commodities valued at $16,727,176, or more than 50 per cent of the total value.

CHAPTER XIV

ATTLEBORO

CENTER OF JEWELRY PRODUCTION IN THE EAST

It is interesting to speculate upon what a writer who, touching upon the industries of Attleboro, a century ago, would have selected as the highlight to be exploited.

One thing is certain. He would not have found it possible at that period to refer to the locality as the center of the production of jewelry. Undoubtedly, he would have emphasized its importance as the habitat of cotton textile manufacture, with minor emphasis on other types of commodities then locally produced.

In 1809 the Beaver Dam factory, located on the race-way of Whiting's Pond, was operated as a cotton factory, and two years afterwards Ingraham, Richardson & Company erected another cotton mill, which later was operated by Whitaker, Richardson & Company. A cotton factory built at Attleboro Falls in 1809, was burned, but a new structure was erected on the site, which by 1830 gave employment to forty hands. The so-called City Factory, located on Mile River, was built in 1813 and one at Lanesville, on Abbott's River, was erected in 1826. In 1809, the three story Dodge factory was constructed, and eleven years later possessed 1,320 spindles. About 1812 what was known as the Atherton factory was built at Hebronville. In 1809 the forge established by Robert Sanderson, in the village of Mechanics, was bought for $5,000 by Elijah, Ezra and Jabel Ingraham, of Pawtucket, R. I., and Henry Sweet, of Attleboro.

BUTTON MANUFACTURER WAS THE FORERUNNER OF JEWELRY PRODUCTION

As early as 1793 Edward Price, an English emigrant, began the production of metal buttons at Attleboro.

On March 24, 1804, George W. Robinson was granted a patent on an improvement in manufacturing coat and waistcoat buttons, and built at Attleboro a factory which ultimately resulted in the concern becoming the most extensive producer of metal buttons in the United States.

In 1812 Colonel Obed and Otis Robinson formed the first company ever organized in the United States for the manufacture of this type of commodity. In 1823 Richard Robinson & Company began the local manufacture of glass buttons and three years later, when work on a new two-story plant building was begun by the concern, the production of gilt buttons was commenced.

Isaac and Ebenezer Draper, father and son, began at about this period the operation of a tannery in South Attleboro where production continued for over a century.

COL. WILLARD BLACKINTON—A PIONEER TEXTILE LEADER

In 1827 Col. Willard Blackinton began the manufacture of power-loom shuttles, the factory having a capacity of twenty-five dozen per week, and the business ultimately grew to a volume of $10,000 per annum, which was thought to be a large sales quota for that period.

Colonel Blackinton was the founder of what ultimately became one of the largest manufacturing enterprises of Attleboro, outside of the jewelry trade, and he takes rank as one of the pioneers, if not the real founder, of the production of "first-class domestic braids."

About 1815 hand-looms which had been universally employed in the production of cotton fabrics began to be superseded by power looms, and a few years later John Thorpe, a native of Attleboro, evolved and introduced the braiding machine.

About the same period a group of twelve Scotchmen was engaged in cotton weaving in a factory, located on the site of what in later years was known as the Union House.

There was also at this time in what was then a part of Attleboro, but is now Plainville, a nail factory, another at Attleboro Falls and one at Deantown. A tannery was located on Elm Street, in North Attleboro, and David Whiting was operating there a shop for turning hubs and wheels. Iron ore was being dug in a quarry off Elm Street and combs, hooks and eyes were being locally produced at the same period.

COL. OBED ROBINSON BEGINS THE PRODUCTION OF CARBON JEWELRY

About 1807 Col. Obed Robinson began the manufacture of carbon jewelry, at Robinsonville, but in all probability he was not the first local artificer in what was destined to become in later years, the primary industry of the Attleboros. An unknown Frenchman, possibly a soldier under General Lafayette, is popularly supposed to have been the first jewelry worker of the locality, and is said to have begun the production of novelties in 1780, occupying as his factory, an old brick forge, which disappeared in 1810. For years he was popularly referred to as "The Foreigner," which is thought to have been a corruption of "Le Fornier."

Colonel Robinson employed "one David Brown, who was called a skilled workman at the art." He may have been taught the trade by "The Foreigner."

In 1810 Manning Richards erected a small shop on his Cumberland Road farm and for a number of years conducted a successful business as a jewelry manufacturer.

In 1821 Draper, Tifft & Company built a two story factory, 22 by 40 feet, which was frequently enlarged in later years, until, following many changes in partnership, the concern grew to be the largest producer of jewelry in the United States.

In 1850 the firm name was changed to Draper, Tifft & Bacon, and five years later to Draper, Tifft & Company, while in 1859 it became Lincoln, Tifft & Bacon, and in 1862, J. F. Bacon & Company.

In 1830 Calvin Richards and George Price erected a jewelry factory, and operated as Richards & Price, later taking S. D. Daggett into partnership.

In 1831, Dennis Everett and Otis Stanley began the business of making watch chains and keys at South Attleboro.

Two years later, H. M. and E. I. Richards entered the jewelry manufacturing field and subsequently took into the firm George Morse, Virgil Draper, Abiel Codding and the sons of several members of the group. In 1834 the concern did business as Ira Richards & Company and in 1875 the name was changed to E. Ira Richards & Company.

In 1835 there was built in the village of Hebronville, in Attleboro, the plant operated for many years as the Cotton Manufacturers Coöperative Waste Co., which was incorporated in 1916, and is now operated under

the management of the Ray Cotton Co., of Franklin, a sales office being maintained at 38 Chauncy Street, Boston, and another in Augusta, Ga.

ATTLEBORO PRODUCTS GO TO EUROPE AND JAPAN, IN THE SEVENTIES

Stephen Richardson and Company entered the field in 1836 or 1837, Abiel Codding being one of the partners. His name appears in connection with several other pioneer firms and his descendants were also associated with later concerns. This firm was the first local unit to attempt exporting products to European countries, and in the '70s it began to develop trade with Japan. It was probably the first of the Attleboro concerns to establish a permanent New York office, as in 1854 it opened headquarters in the metropolis. In 1843 the firm name was changed to Richardson & Miller, and in 1859 to Stephen Richardson & Son.

Daggett & Robinson started the manufacture of jewelry in 1837, at West Attleboro, the firm name becoming Robinson & Company in 1850 and more than sixty years after the formation of the company one of the junior Robinsons was carrying on business in the original brick shop.

In 1840 Albert C. Tifft and William D. Whiting started the firm of Tifft & Whiting in the rear room of an Attleboro blacksmith shop, and being successful from the outset erected a two-story brick factory the next year. In 1847 when they secured a water privilege at Beaver Dam they built a stone factory, which from time to time was greatly enlarged and they added silverware to the gold products.

In 1853, Mr. Whiting purchased the Tifft interests and the name of the concern became W. D. Whiting & Company. In 1866 it was changed to the Whiting Manufacturing Company. This unit was the last of the large silver concerns to abandon the apprentice system and for a long time there hung on the wall of its office the last papers of indenture whereby a boy employee agreed to work for eight cents an hour, the rate being gradually increased until at the end of his four years' apprenticeship he was paid fourteen cents an hour. In 1875, the Whiting plant was destroyed and later was rebuilt, but the concern occupied the new building only about a year when it moved to New York.

J. J. Freeman and B. S. Freeman formed a copartnership in 1847 under the name of Freeman & Brother and in 1851 located their plant on the water power site at Attleboro Falls and engaged in gold jewelry production. In 1860 the firm name was changed to Freeman & Company and in 1879 it became B. S. Freeman & Company. From 1847 to 1851 they carried on the business in a room in their father's house, and the concern was the first in America to manufacture curb chains of rolled gold.

J. J. Freeman bought an imported curb chain and after a long period of experimentation developed a machine which turned out a successful product. He was ingenious and inventive and his mechanical ability gave to the business several machines which replaced hand labor.

In 1849, John F., and James H. Sturdy, who had conducted a die forging and jewelry manufacturing business at Providence, R. I., removed to Attleboro, where they located at Robinsonville, and evolved a method of producing what is known to the jewelry trade as rolled or stock plate. With Herbert M. Draper, they formed the firm of Draper, Sturdy & Company and introduced into Attleboro the manufacture of rolled gold plated stock and jewelry. They were philanthropists in a way as they disclosed their production secrets to other local manufacturers, many of whom adopted the new method, which soon became uni-

versally used by local concerns. The J. F. Sturdy's Sons Co., successor to the original group carries on business today, in North Attleboro.

THE WALTER E. HAYWARD COMPANY

F. G. Whitney and E. W. Davenport formed the firm of F. G. Whitney & Company in 1849, and operated for half a century in the inexpensive jewelry field of production, building up a big foreign business. In 1851, Thompson, Hayward & Co. began business and four years later the name was changed to Hayward & Briggs. In 1859 the original plant was burned and a new concern, C. E. Hayward & Company rebuilt. This designation continued until 1886 when the firm became known as Hayward & Sweet, and in 1891 it was incorporated as the Walter E. Hayward Company. Frank E. Smith is president, Elmer S. Smith, vice president, Walter G. Moon, secretary, and Frank J. Ryder, treasurer of the concern. For many years this company manufactured only 18-carat gold products and it soon became the most important jewelry unit in the east part of Attleboro. Today it carries on an extensive foreign business in Canada, the Philippines, South America, China and Japan.

Gold front and plated jewelry constitute the present-day products, upwards of 100 hands being employed. The concern is capitalized for $300,000.

The A. H. Babcock Company was formed in 1851.

In 1852 White & Shaw began the manufacture of jewelry at South Attleboro, being the first unit of that kind to locate in that village.

In 1854, George K. Davis & Company, composed of Mr. Davis and C. W. E. Sherman began the refining of precious metals in a little shop near Davis Bridge, on Ten Mile River, the concern being the first to enter the refining field in Attleboro. Two or three years later Mr. Sherman withdrew from the firm, erected a small shop on Elm Street and 20 years later took his son into the business, carrying on assaying, smelting and the manufacture of blue vitriol. In the eighties the concern was recovering between $50,000 and $60,000 worth of gold annually from the waste that came from the Attleboro jewelry plants.

In 1856, G. A. Dean began the manufacture of jewelry, the concern becoming G. A. Dean & Co., in 1884. In the intervening years the firm was variously known as Everett, Dean & Co., Day, Bliss & Dean, and Bliss & Dean.

In 1857, the firm of Skinner, Viall & Company came into being.

BATES & BACON

The present firm of Bates & Bacon was formed in 1857 under the name of Skinner, Viall & Company and in 1858 the name was changed to Bates, Capron & Williams, but two years later the senior member of the concern sold his interests and began business in his own name, taking George M. Bacon into partnership in 1867, and operating as Bates & Bacon. The firm engaged in the production of rolled gold plated bracelets. In 1882 the production of watch cases was added, the company being the first Attleboro unit to engage in this line.

The present-day unit of Bates & Bacon, Inc., is made up of A. S. Blackinton and F. E. Tappan, and it employs 150 operatives.

THE JAMES E. BLAKE CO.

In 1859, Charles H. and Albert W. Sturdy began production in the Steam Power Company's building, and when the structure was burned

two years later the firm moved to Mansfield, but returned when the Power Company rebuilt. During the Civil War period the concern was very successful, producing army badges, regimental insignia and other war-time products, and after peace was declared entered upon the manufacture of women's rolled plate jewelry. In 1871, C. H. Sturdy retired and E. G. Webster became a member of Sturdy & Company, and in 1885, James E. Blake and Edward P. Claflin purchased the controlling interest in the concern, and the firm of Blake & Claflin was formed in 1889 and today is known as the James E. Blake Company, and was incorporated in 1922.

The concern has capital of $100,000, and employs 75 operatives in the production of sterling silver and gold jewelry, William H. Blake being president and treasurer.

INDUSTRIES FORMED IN THE SIXTIES AND SEVENTIES

The sixties and seventies witnessed the advent of many Attleboro concerns into the manufacturing field, Nerney & Company formed in 1862 subsequently becoming Short, Nerney & Company, entering the field of electro-plating in 1868, and being succeeded by Nerney & Lincoln. In 1888, C. S. Smith & Brother, composed of Charles S. and Harvey L. Smith purchased the business, while T. I. Smith began business previous to 1869, as Codding & Smith, the name being changed in 1865 to Codding, Smith & Company.

The firm of Sadler & Stanley was formed in 1863, and later became Sadler Brothers, Inc., under which name it operates today, at South Attleboro, employing fifty operatives, in the production of celluloid goods and novelties, Thomas G. Sadler is treasurer, and Thomas G. Sadler, Jr., clerk of the corporation.

Bronson & Wilmarth formed a partnership in 1864, becoming the W. D. Wilmarth Company in 1872, and from the beginning this concern made a specialty of casket and coffin trimmings. In 1890, Charles F. Holmes was a partner with W. H. Wilmarth, in the firm of Wilmarth, Holmes & Co.

The concern does business today as W. D. Wilmarth & Co., of which W. H. Wilmarth is president, and H. P. Wilmarth, treasurer.

B. B. & R. Knight started operations at the Hebronville and Dolgeville plants in 1865, and these units were incorporated in 1919.

J. S. Luther & Company began business as lapidaries, in 1865, and the same year Draper, Pate & Bailey began operations, later becoming F. S. Draper & Company. Streeter Brothers, consisting of Henry A., and John F., entered the field in 1866, and the same year H. E. Swift and H. C. Blackinton began the manufacture of electrical appliances, later selling to Earl C. Smith, who formed the Smith Electric Co. The firm of A. Bushee & Company was formed in 1868, and made a specialty of an original separable sleeve button, collar button, and stud.

It was in 1868 that Robert Wolfenden initiated his dye works at Attleboro, admitting his sons, John W., and Oscar to partnership ten years later. Upon the death of the founder, the name became R. Wolfenden & Sons, under which it now operates. Upwards of 175 employees are engaged in the dyeing and bleaching of fabrics, the present partners being Oscar and Harry C. Wolfenden. The plant is the largest in the world exclusively devoted to dyeing, and has a capacity of 50,000 pounds of fabrics a day.

W. & S. Blackinton was formed in 1868, by William, Samuel and Lewis Blackinton, and in 1869, Horton, Angell & Company, came into

being,—the first local concern to pay its employees weekly. The original partners were E. J. Horton, B. J. Angell and G. M. Horton and the firm engaged in rolled gold plate, wire and tubing, which constitutes the present-day product. The corporation now known as Horton-Angell Co., has capital of $515,000, and employs 100 hands, C. L. Watson is president, W. A. Cunningham, treasurer, and T. F. Manning, secretary.

Mason, Draper & Company started business in 1870. Young and Bennett began business the same year and in 1871 Stanley Brothers and Cummings & Wexel, which later became E. N. Cummings & Company entered the field.

Smith & Crosby, established in 1872, by William H. Smith and Alfred H. Crosby, still operates under the same name, the present partners being Alfred T., and George H. Crosby. This concern manufactures plated and ten-carat jewelry.

In 1872, L. and W. Wilmarth established the firm of Wilmarth Brothers, which later became Wilmarth & Co., and which, in 1890, was bought by E. B. Bullock. P. E. Witherell began business in 1873 as Hayward & Carpenter, the firm name being changed to Hayward & Witherell, in 1879. Bliss Brothers & Everett started operations in 1873, the concern now being known as Bliss Brothers Company, and owned by J. F. Rioux. Sixty employees are carried on the payroll, gold filled and sterling silver jewelry being manufactured by the concern.

R. F. SIMMONS & COMPANY

R. F. Simmons & Company began business in 1873, and under its present management has grown to be one of the leading industries in the city, specializing in the famous Simmons chains, and being one of the large national advertisers of Massachusetts.

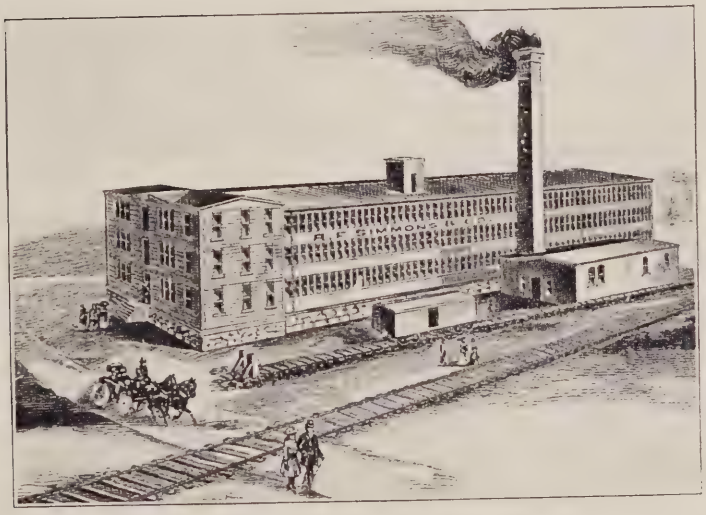
It employs upwards of 250 operatives, and the present partners are Joseph L. Sweet and Hon. Harold E. Sweet.

This concern is a conspicuous example of the ability of Massachusetts manufacturers to adapt themselves to rapidly changing conditions. Only recently a typical example of a liability becoming a quick asset was observed in the R. F. Simmons plant. Those who follow "The Gay Nineties" series of cartoons in *Life* may perhaps recall the famous eye-glass chains which were so firmly anchored in my lady's coiffure by a gold hairpin. That style went out like many others at the turn of the new century, and there lay idle, abandoned and apparently useless in the company's plant a machine that had been built for the express purpose of turning out these hairpins. There seemed to be no use for it save as an item in the obsolescence column. But the recent popular trend in men's wearing apparel toward the soft-collar shirt created a demand for gold collar pins. The old hair pin machine was uncovered, the dust removed, the parts oiled, and Aladdin-like there proceeded from its mechanical parts a new up-to-the-minute collar pin to supply the market, and the device is again in daily operation after a lapse of a quarter of a century.

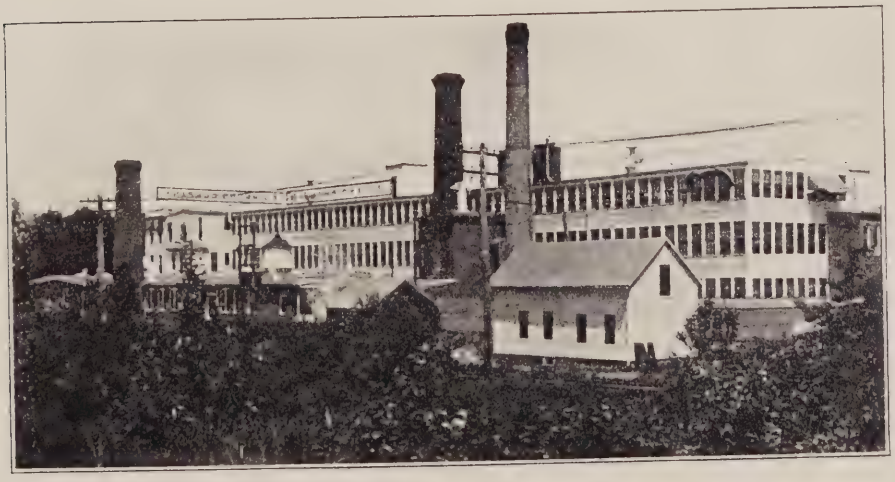
In 1874, Watson, Newell & Company, which began business as Cobb, Gould & Company started operations, changing its name in 1880 to Watson & Newell, and in 1887 to Watson, Newell & Company. This unit was the predecessor of the present Watson Company, capitalized for $500,000, and employing 200 operatives in producing sterling flatware and hollow ware. C. L. Watson is president and treasurer, and Joseph E. Straker, vice president, R. F. Crawford, assistant treasurer, and F. E. Briggs, secretary, of this large corporation.



ORIGINAL PLANT WHERE THE
R. F. SIMMONS COMPANY BEGAN
BUSINESS IN 1873



PLANT OF THE R. F. SIMMONS COMPANY, 1892



PRESENT PLANT OF THE R. F. SIMMONS COMPANY, ATTLEBORO

Demarest & Bradley came into the field in 1874, and the firm was known at one period as Demarest & Fisher. R. B. MacDonald began business in 1874 and was incorporated in 1913, as R. B. MacDonald & Company and is still operating under that name, with capital of $50,000, and employing fifty hands in the manufacture of jewelry, R. B. MacDonald being president and treasurer, and W. M. Thayer, secretary.

Joseph J. Doyle began jewelry manufacturing in 1875, and John Etzenperger entered the field in 1876. Sandland, Capron & Company started business the same year. M. B. Short, Peter Nerney, and J. J. Horton formed the firm of Short, Nerney & Co., in 1876.

THE S. O. BIGNEY COMPANY

In 1879, the firm of Marsh & Bigney was started, and was successful from the outset. In July 1894, Col. Sidney O. Bigney, the junior member purchased the interests of his partner, and from that date to this he has owned and operated the concern. It was incorporated in 1920 as the S. O. Bigney Company, with $300,000 capital. It employs 100 operatives in the manufacture of gold filled chains and novelties. Col. Sidney O. Bigney is president and treasurer, H. V. Himes, vice president and Arthur Payette, secretary.

In 1879, Harris & Fisher, now J. M. Fisher & Company, started business. The corporation is capitalized for $150,000 and employs fifty operatives in the manufacture of jewelry. Samuel M. Holman, Jr., is president, Lewis S. Chilson, treasurer, and L. W. Perry, secretary. S. W. Gould & Company began manufacturing operations in 1880.

In 1880, Messrs. Barber & Burlingame, engaged in gold and silver refining, being succeeded ten years later by William L. Slade and Frank C. Whipple. The firm of Cheever & Bonnett was dissolved in 1880, and John P. Bonnett carried on business thereafter in his own name. The Home Bleachery & Dye Works was started in 1880, and incorporated in 1902. W. G. Clark & Company was formed in 1881, and Dominick & Haff started business the same year, being incorporated in 1889.

The F. H. Sadler Company was formed in 1881, and was incorporated in 1904, and again in 1917, the concern being among Attleboro's present day industries. It is capitalized for $60,000, employs forty in the production of gold, gold-filled and sterling silver jewelry, and L. E. Sadler is president, and F. H. Sadler, treasurer.

D. F. Briggs commenced manufacturing at Attleboro Falls, in 1882, the concern being incorporated in 1910, and now being known as the D. F. Briggs Company, employing 125 hands in the manufacture of bracelets, vanity cases, and chains. F. E. Tappan is president, and F. C. Wilmarth, treasurer and the company has capital of $1,000,000.

Daggett & Clap, who began business in Mansfield, removed to Attleboro in 1882, and ultimately became Harvey Clap & Company, by which name the concern is still known. It employs 150 operatives and produces solid gold chains. The present partners are Harvey E., and George P. Clap.

Messrs. Lindsay and Inman established the firm of J. T. Inman & Co., in 1882, and eight years later Lindsay retired. Mr. Inman formed a new partnership with James McNerney, under the former firm name. The concern specializes in silver goods, J. T. Inman being the sole proprietor today.

H. H. Curtis & Company and Riley & French, both entered the field in 1883, and the latter concern still carries on operations in North Attleboro. The firm of C. A. Wetherell & Co., composed of Charles A. Wetherell

and William Nerney, was established in 1885. C. R. Harris began business the same year, and J. N. Hugo & Company also started as Knight & Berry in 1885. T. J. Halliday & Company also entered the field that year and subsequently became Burnett & Halliday. Wheaton, Richards & Company began business in 1886.

THE D. E. MAKEPEACE COMPANY

The D. E. Makepeace Company was formed in 1888, and incorporated in 1902, and is still operating under the original name.

The company maintains a metallurgical laboratory and employs an experienced metallurgist. This factor has been of great value to the concern in producing metals that are satisfactory to the trade both as to temper, workability, and color. In its laboratory the company has been able to alloy golds which have such a high degree of workability that they have saved a great deal of money to the manufacturers due to the minimum loss of scrap and labor.

David E. Makepeace, the founder, had done considerable gold rolled plating previous to 1885, but in that year he started business in Providence, and continued there until 1888 when he removed to Attleboro where he began operations with one pair of rolls and a gas furnace, hiring a small space in a jewelry plant occupied by another company, later removing to the old "Steam Power Building," and in 1900 he erected a three-story wooden factory, later adding a three-story brick structure, the total area of the plant being in excess of 30,000 square feet.

The D. E. Makepeace Company is capitalized for $100,000, and employs 125 operatives in manufacturing rolled gold plates. D. E. Makepeace is president, A. A. French, treasurer, and William E. Sweeney, secretary.

In 1887, John Anthony, who began the manufacture of chains and bracelets, in North Attleboro, three years before, removed his business to Attleboro. The Leach & Garner Company came into being in 1889 and the concern still carries on under this name. It has capital of $100,000, employs upwards of 100 operatives, and manufactures gold and silver plate in sheet, wire and tube form. Edwin F. Leach is president and Stephen H. Garner, treasurer and secretary.

C. E. Streeter & Co. began the manufacture of badges and regalia, in 1889 and the same year the Bates Button Co., succeeded Costello & Co., which concern had begun manufacturing, in 1886. The Dillon Manufacturing Co., began the production of electrical supplies in 1889, and soon afterward sold to M. E. Clemons. In 1890, F. M. Ellis and G. W. Livsey began the manufacture of chains under the firm name of Ellis, Livsey & Co. E. D. Gilmore & Company began business in 1891 and is still carrying on under this name, the concern employing thirty-five hands in the production of ten and fourteen-carat jewelry, the present partnership being made up of E. D., and E. L. Gilmore, and William L. King. W. A. Spier started operations the same year.

C. A. Marsh & Company began business in 1892 and is still operating under its original name, the present partners being George L. Shepardson and F. C. Rounseville. It manufactures belt buckles and employs forty operatives. McRae & Keeler, Inc., began business as a partnership, in 1893, was incorporated in 1921, and is one of the city's busy industries today, being capitalized for $100,000, and employing upwards of 100 hands in the manufacture of jewelry and novelties. A. A. McRae is president, L. E. Pitman, vice president, S. J. Greene, treasurer, and L. P. Keeler, clerk, of the corporation.

As early as 1864, Peter Nerney and Mace Short began the manufacture of gold filled chains and the reputation for quality products built up by them led to the formation in 1894 of the Bay State Optical Company which today ranks as one of Attleboro's leading industries. It has capital of $60,000, specializes in optical goods and employs upwards of 200 hands. E. D. Nerney is president, George E. Nerney, treasurer, and F. J. Nerney, secretary.

The H. & B. American Machine Company also came into being in 1894 and still carries on under its original name, the plant being located in South Attleboro, and it maintains a Boston office, at 161 Devonshire Street. It has capital of $3,600,000, and is the largest local employer of labor, carrying between 1,000 and 1,100 hands on its payroll, in the production of cotton machinery. C. E. Riley is president, E. R. Richardson, treasurer, and E. L. Martin, secretary, of the corporation.

The firm of Carter, Qvarnstrom & Remington was formed in 1899. E. J. Qvarnstrom is today the sole proprietor of the concern, which employs seventy-five operatives, in the manufacture of plated jewelry, making a specialty of lockets.

In 1899, the Attleboro Refining Co., was established, and is owned by Harold D. Baker, the concern specializing in the refining of gold and silver by-products. Sykes and Strandberg began business in the same year, the partnership being made up of George H. Sykes and Gustave W. Strandberg, employing upwards of 100 operatives in the production of solid gold and silver and gold front jewelry.

LOCAL CONCERNS FORMED SINCE 1900

The twentieth century accessions to Attleboro's list of manufacturers give evidence of increasing productivity and indicate that by no means is industry declining in the jewelry center of Massachusetts.

In 1900 The Leach & Miller Company was formed, the present partnership consisting of L. A. Leach and Letty Leach Bears, fifty employees being carried on the payroll and engaged in the production of silver and gold filled costume jewelry.

The Electric Chain Company of Massachusetts, was established the same year, and was incorporated in 1904, with capital of $37,500, and the concern employs fifty hands in the manufacture of jewelry and chains, George F. Sawyer being president, Fred A. Bagnall, vice president, and Fred S. Johnston, secretary and treasurer.

The Standard Jewelry Company was organized in Plainville, in 1893, and removed to Attleboro, in 1900.

In 1901, the C. H. Eden Company was incorporated, with $300,000 capital, and now employs upwards of 100 men and women in the manufacture of jewelry and novelties, S. M. Stone being president, E. H. Brown, treasurer, and C. O. Mathewson, secretary.

In 1904, Guyot Brothers Co., Inc., began the manufacture of tools, dies, and jewelers' findings, the concern having capital of $50,000, and employing upwards of fifty operatives, Arthur F. Guyot, is president, William C. Boots, vice president, Gaston A. Guyot, treasurer, and Carl W. Keil, secretary.

The W. E. Richards Company was formed in 1904, and was incorporated three years later, with $80,000 capital, and employs sixty operatives in the production of gold jewelry, maintaining offices in New York and Chicago. R. M. Horton is president and treasurer, and C. A. Howard, secretary.

The Sweet Manufacturing Company began the production of machine chain, in 1904, and employs thirty operatives.

In 1905, Saart Brothers Company was formed, and in 1916 was incorporated with $171,000 capital to engage in silversmithing. James V. Toner is president and treasurer, and A. G. Saart, secretary of the corporation which employs 100 operatives and specializes in silver toilet and hollow ware.

The John A. Cunningham Company was established in 1906, and employs fifty operatives in the manufacture of gold-filled jewelry, John A. Cunningham being president and treasurer, of the concern.

Thomas Heath began hub and die cutting, the same year, and is still carrying on the business under his own name.

F. L. Torrey & Company, a partnership made up of F. L. Torrey and Joseph Kerkhoff was formed in 1906, and employs fifty operatives in the production of jewelry and men's belt buckles.

The same year Barden & Hall succeeded Chapman & Barden, which concern in turn followed Barden, Blake & Company.

In 1908 the Elliott & Douglas Mfg. Company was formed and four years later it became a corporation, being capitalized for $10,000, and engaging in jewelry manufacture. W. M. Bowman is president, John A. Thayer, treasurer, and S. E. Knight, secretary.

The H. A. Allen Company was established in 1904, and is owned by H. A. Allen, employing fifty operatives in gold-filled jewelry production.

In 1909, H. E. S. Thompson, R. R. Swan and J. D. Patterson formed the firm of Thompson, Swan & Patterson, and began the business of electro-plating in the Robinson Building, occupying in office and factory space not over 225 square feet, the force including the three partners, a bookkeeper and an errand boy, and the total capital did not exceed $500. In 1910 and 1911 Mr. Thompson purchased the interests of his associates, and increased the floor space to 2,000 square feet, and a year later to 4,000 square feet.

On June 1, 1928, Mr. Thompson purchased a factory building, where he occupies 3,900 square feet of manufacturing area, and 29,250 square feet of land. The H. E. S. Thompson Co. employs twenty operatives.

The Clegg Manufacturing & Tool Company was formed the same year by Joseph Clegg to manufacture jewelers' tools, sheet metal novelties, and special machinery, and is still carrying on its activities.

The Crown Manufacturing Company began business in 1910 as a partnership, being incorporated the following year, with $1,000,000 capital, to manufacture cotton yarns, and now employs upwards of 850 operatives, at its South Attleboro plant, E. Kent Swift, being president, B. C. Chace, vice president and general manager, Edward E. Leonard, treasurer, and S. E. Jackson, assistant treasurer.

The Ballou Manufacturing Company was incorporated in 1910, and the following year Collingwood Brothers began the manufacture of woven wire chains, and soft collar and lingerie pins, Messrs. F. P. and H. W. Collingwood constituting the partnership.

The American Carrier Company was formed in 1911, while the Union Plate & Wire Co. started operations the same year, and now employs 100 operatives in the manufacture of rolled-gold plate, seamless tubing, and wire and flat stock for jewelry production. The concern was incorporated in 1913.

The J. & L. Tool Company was formed in 1912, by E. L. Johnson

and Olaf Lundsten, as a partnership, to manufacture jewelers' tools and findings, and now employs forty operatives.

The same year A. B. Cummings began the production of toy moving picture machines and phonographs, and at the present time employs upwards of 100 operatives.

The General Findings & Supply Company was also established in 1912, as a partnership by E. F. Leach and S. H. Garner, and has grown rapidly until today the concern employs upwards of 150 operatives.

Spellmeyer & Carey began business in 1913, and the Morse-Andrews Company was established that year, and was incorporated the following year, now employing upwards of 100 operatives, in the manufacture of men's belt buckles, in sterling, plate, and solid gold, William J. Morse being president and treasurer, and Walter A. Briggs, secretary.

THE L. G. BALFOUR COMPANY

L. G. Balfour began business in 1913 and the concern was incorporated a year later as the L. G. Balfour Company and in the intervening years has assumed an important position in the industrial life of the city. Specializing in college fraternity and special insignia, and having made phenomenal strides in production, today upwards of 400 hands are employed. The concern is capitalized for $400,000, and maintains a Boston office in the Statler Building, and, in 1927, the Attleboro city council approved an application from the company for the purchase of 19,000 square feet of municipal realty upon which the concern has since erected two large factory buildings, the remaining area affording parking space for the automobiles of the employees of the company. L. G. Balfour is president and treasurer and J. Roscoe Brooks, secretary.

The Fuller-McFarlane Company commenced operations in 1913, and the same year the M. S. Company Inc., was formed, being incorporated in 1923, with $150,000 capital. It now employs 200 operatives in the manufacture of chains and chain findings. S. M. Einstein is president, Max Schweinshaut, treasurer, and Eugene Claupin, secretary.

The Attleboro Braiding Company began business in 1915 and is capitalized for $200,000. It employs 100 operatives in the production of shoe and corset laces, and in winding, bleaching and dyeing cotton and worsted yarns, braids, tapes and threads, Sanford H. Cohen being president and treasurer, and Bernard Boas, assistant treasurer. The plant is equipped with 1,400 braiding machines, and 4,000 twist spindles.

The Bliss Holbrook Company was formed in 1916, and incorporated the following year. The Metal Specialties Company began operations in 1916, and was incorporated two years later, with $50,000 capital, and manufactures mailing box fasteners, H. R. Holbrook being president and treasurer, and L. M. Holbrook, secretary.

In 1916, the Millard Leather Company was formed, and was incorporated in 1922, with $100,000 capital. It now employs fifty operatives in producing tanners' fancy leathers, Harry S. Millard being president, Karl B. Brooks, treasurer, and William F. Harty, secretary.

The Santos Company began business in 1917, and the American Metalcrafts Company, Inc., formerly the American Emblem & Badge Company was formed in 1918, and was incorporated in 1923. It employs thirty hands in the manufacture of emblems, badges and metal advertising specialties, Thomas Kelliher is president, G. C. Haberlin, vice president and John Maguire, treasurer.

The Baker & Potter Refining Company was started in 1918, by George M. Baker and Elwin A. Potter, and carries on refining.

FRANK MOSSBERG—ATTLEBORO'S PROLIFIC INVENTOR

In 1899 Frank Mossberg organized the Frank Mossberg Co., which succeeded his original machine shop that he set up in Attleboro ten years before, and in which he had manufactured a full line of jewelers' and silversmiths' tools, that early became recognized as standard devices. Mr. Mossberg ranks as one of the most prolific of Massachusetts inventors of this and the last century, upwards of 100 patents having been granted to him, the most important of which are in connection with roller bearings and adjustable wrenches.

In 1927, the Apco Company, of Providence, R. I., was linked with the local concern, under the new corporate name of Apco-Mossberg Company.

For twenty-five years the Attleboro unit had been steadily growing in its production of automobile wrenches, and with the absorption of the electrical automotive equipment of the Apco unit a force of 300 has been constantly employed, some of the departments operating twenty-four hours a day.

The wrench products of the concern are used by the Ford Motor Company, and the new model put on the market in 1928 was supplied with Apco-Mossberg cranks. The combined assets of the new corporation are close to $2,000,000 and the combined sales approximate a similar amount. The Mossberg plant contains in excess of 100,000 square feet of manufacturing space, but already every available inch is being utilized at the Attleboro factory and while no definite plans have been announced for expansion it seems probable that in the not distant future other buildings and an additional working force will be required.

In 1929, the company officials announced that, in collaboration with the engineers of a large electrical company, a design had been perfected and accepted for "an important part of the equipment used in talking movies." The device sells for several dollars each and the first order for a trial quantity was executed that year. What this will eventually mean to Apco-Mossberg is a matter of speculation, but there is reason to believe that the quantity finally released will tax the entire capacity of many departments for a long time to come.

The more recently formed unit established by Mr. Mossberg,—the Mossberg Pressed Steel Corporation,—capitalized in 1918 at $400,000, employs 150 hands in the production of pressed steel specialties, for textile and wire mills, all of the machinery employed in the various intricate processes having been designed, patented and built by the man whose name the corporation bears.

Frank Mossberg, is president, D. E. Makepeace, vice president, and A. E. Spark, Jr., treasurer and R. V. Olson, secretary of the Mossberg Pressed Steel Co.

Bates & Klinke, a partnership which includes H. Bates and O. F. Klinke, began jewelry manufacturing in 1919, while the firm of Pitman & Durell came into being the same year.

THE BAER & WILDE COMPANY

The Baer & Wilde Company was incorporated December 31, 1919, having been previously a subsidiary of the Attleboro Manufacturing Co., which was incorporated in 1902.

The company has specialized in men's jewelry, at one time having

made some thirty items in the line of these accessories. In 1918 it started the manufacture of KUM-A-PART cuff buttons, under its own patents and this item grew to such proportions that it was necessary to discontinue the manufacture of all other products. Since that time the company has specialized in manufacturing the KUM-A-PART cuff button, which is made in all grades of gold plate, solid gold and platinum. Recently the Swank collar holder and Swank Klip tie holder have been added to the line.

KUM-A-PART Products have been advertised nationally since 1918, since which time approximately three-quarters of a million dollars have been spent, mainly in national magazine space.

The officers of the company are: S. M. Stone, president; L. E. Baer, treasurer; J. L. Grant, vice president in charge of sales, and J. C. Bagnall, vice president in charge of production. The corporation has capital of $500,000 and employs upwards of 250 operatives.

In 1920 the Ralph R. Gunner Manufacturing Co. was established by Ralph R. Gunner, and specializes in the manufacture of jewelers' findings.

William D. Jordan began the same year the manufacture of bracelets, necklets, and ecclesiastical goods, and the Keller Manufacturing Company was also formed in 1920.

The Larson Tool & Stamping Company was incorporated that year, with $55,000 capital, and employs forty operatives, in the manufacture of pressed steel stampings, tools and wrenches, N. G. Larson being president, C. W. Cederberg, treasurer, and Carl G. Larson, secretary.

The L. M. Flanders Company was formed in 1920, while S. Dosick & Company was established the same year.

In 1921, the American Re-enforced Paper Company was established, with capital of $93,000, to manufacture re-enforced waterproof paper, P. T. Jackson being president, W. N. Stevenson, treasurer, G. E. Gibbs, vice president, and John Noble, secretary.

Joseph H. Appleton and Fred G. Simmonds formed a partnership under the name of The Appleton Studios, in 1921, and manufacture art novelties, employing thirty-five operatives.

The W. S. Hough, Jr., Company, which started business in Providence, R. I., in 1879, and continued operations in that city until 1921, was consolidated with one of Attleboro's largest manufacturers of rolled gold plate and gold plated seamless wire and tubing—the Horton-Angell Co., which has capital of $515,000, and employs upwards of 100 operatives.

C. L. Watson is president, T. F. Manning, secretary, and W. A. Cunningham, treasurer, of the Horton-Angell Co.

The Automatic Machine Products Co. was formed in 1922, and the following year the Qroil Company was established.

SOME RECENT DEVELOPMENTS

Attleboro is one of the many cities where the critic of industrial Massachusetts is puzzled when he tries out his funeral dirge, and he finds it hard to explain away what has been transpiring there within the past few years.

When the B. B. & R. Knight Company abandoned its big plant at Hebronville, where for so many years this unit had brought a degree of prosperity to that section of the city of Attleboro, some predicted a decaying village, but, in 1927, the Ray Cotton Company connected with the Ray interests, at Franklin, took over the factory, giving employment at the

outset to fifty men and women, with every reason to expect an augmented force as the years go by.

It was in 1927, too, that the American Re-enforced Paper Company which had found its requirements demanding additional plant capacity, decided to erect on Starkey Avenue, a new factory, 173 feet long, 63 feet wide, and 24 feet in height, with a concrete shipping platform 10 feet wide, extending the entire length of the building, adjoining the spur railroad track, and a brick and steel boiler house, with a 20,000 gallon fuel oil storage tank, besides a sizable "Kettle house," the entire plant being one of the most up-to-date manufacturing units in the state. Started in the old plant on County Street, in 1921, the American Re-enforced Paper Company did a business of $500,000 in 1927.

Early in 1927 the idle $1,000,000 plant of the Home Bleach & Dye Works, located in the southerly part of Attleboro, was taken over by the Pawtucket Card Board Company which removed its business from Pawtucket, R. I., and Dudley, Mass., installing side tracks from the New Haven irons to better facilitate the handling of its long-established and successful business. The Home Bleach & Dye Works were established fifty years ago and originally the plant was operated by the Union Wadding Company as a bleachery. In 1884 Peter B. McManus leased the property from the Wadding Company and in 1905 he purchased the buildings. In 1919 the plant was sold to New Bedford interests, who operated it until 1925.

In January, 1927, came the consolidation of the J. Briggs & Sons Company, the oldest manufacturers of rolled plate in the United States, located at Providence, R. I., with the General Plate Company of Attleboro, the amalgamation being effected by the purchase of the former concern by the latter. This meant the local acquisition of the stock and machinery of the Providence unit and the addition of a number of employees. For sixty-six years the Briggs concern had shipped its products all over the United States and to England.

As is so frequently emphasized, it is in the diversity of its industries that the strength and future of a modern community lies, and in this respect Attleboro is keeping step with the procession of progressive Massachusetts industrial cities and towns, for, in 1927, Rhode Island lost another unit to Attleboro, when the Raymond Cooperage Company removed from Pawtucket to South Attleboro, where a sizable workshop was erected.

The Tennel Company, a new concern, began operations that year with a force of between twenty-five and fifty hands, in the Kum-A-Part factory, engaging in a French enameling art process, quite different from that hitherto employed in Attleboro jewelry units.

Attleboro's contribution to the host of honors accorded Col. Charles A. Lindbergh was a rare bit of workmanship turned out and shipped in record time by the C. M. Robbins Company, which was delivered after a fast flight by airplane from Lowney Field, Mansfield, to the flying field at New York, and presented to Lindbergh at the Waldorf-Astoria banquet. Establishing a new record for production in the face of a seemingly hopeless task, which other firms elsewhere would not undertake, the Robbins Company gained laurels for the skill, speed and craftmanship of Attleboro workmen. The assignment, produced in less than a week, included in addition to the gold medal, 100 silver and 1,500 bronze replicas.

Another Attleboro concern also won recognition for the city in 1927 for the high type of workmanship which has spread its name far and

wide. The Boston Chapter of a noted American association selected Commander Richard Byrd as an outstanding American naval officer of the year, paying him double honor for his trans-Atlantic flight and also for his North Pole exploration. The Byrd medal was designed by one of the artists of the L. G. Balfour Company, and produced at the local factory.

Another unique example of the progressiveness of Attleboro manufacturers is found in the plant of Collingwood Brothers, makers of woven wire chain for manufacturing jewelers, where for several years every worker's bench has been equipped with radio ear-phones until the factory has become known as the only "radioized manufacturing institute" in the United States. Throughout the day and at night when there is overtime work to be performed, employees of the factory can listen in, if and whenever they please to the almost continuous series of radio programs. Thus it has been during the "Battle of the Century," the World Series games, the return of Colonel Lindbergh, and other great events that the employees in the Collingwood plant have been privileged to hear the announcements and the cheers, and at the same time add to their pay envelopes money which otherwise would not have been found there at the end of the week. In fact, the idea came about as the result of a request made by an employee that he be given time off to listen to the radio story of a World Series game. The Messrs. Collingwood emphatically assert that the radio programs increase efficiency.

In May, 1927, the plant formerly occupied by the H. A. Allen Company was taken over by Leslie O. Wetherell, of Chartley, and the new concern is operating under the name of H. A. Allen & Company, Inc.

In 1927, the W. E. Richards Company took over 2,000 additional square feet of manufacturing space in the factory owned by the R. F. Simmons Company.

In the same calendar year, an increase in production facilities was made at the plant of the Dodgeville Finishing Company, Inc., a new Attleboro concern, which, starting operations in February of 1927, when it was incorporated, increased its business to such an extent that a double shift was found necessary. New electric machinery was installed to supplement the existing water power. The dyeing, bleaching and finishing of cotton, rayon filled and celanese piece goods is carried on, the plant having a weekly capacity of 750,000 yards. James W. Singleton is president, and James W. Tingley, is treasurer. One hundred operatives are employed.

OTHER ATTLEBORO CONCERNS OF TODAY

Among other present-day industries in Attleboro are C. H. Allen & Co., owned by Charles H. Allen, employing 30 in the manufacture of gold-plated jewelry; M. F. Ashley & Co., owned by Edward G. Ashley, producing cabinets; the A. A. Augat Machine Co., manufacturing jewelers' tools, press work and special machinery; the A. H. Babcock Co., owned by Henry McGill, producing jewelers' boxes and display pads; the Thomas H. Brennan Co., owned by Thomas H. Brennan, manufacturing enameled gold and silver ware; J. F. Bride & Co., owned by J. F. Bride, employing thirty-five in producing enameled gold and silver articles; the George L. Brown Co., with capital of $60,000, employing twenty-five in the manufacture of jewelry, George L. Brown being president and treasurer, and H. C. Andrews secretary; the L. P. Brown Machine & Tool Co., with capital of $20,000, specializing in machinery, jigs, fixtures and tools, L. P. Brown being president, and J. A. Martin, treasurer and secretary; the Canbec Tool & Stamping Co., engaged in machine and tool work,

the concern being owned by William Cloutier; the Cooke, Harding Chain Co., owned by Robert L. Cooke, manufacturing machine made chains; F. J. Cooper, engaged in jewelry production; the D. & D. Chain Co., owned by Joseph B. Bloom, employing thirty-five hands in the manufacture of watch bracelets and novelties; the Dee Jewelry Co., owned by Samuel Dosick, producing jewelry and novelties; the A. A. Doty Co., owned by A. A. Doty, employing thirty hands in the manufacture of jewelry novelties; the Fillkwik Co., capitalized for $75,000, and of which Charles N. Polsey is treasurer, A. S. Shields, president, and F. B. Miller secretary, employing thirty-five operatives in the manufacture of cigarette cases; the Finberg Manufacturing Co., Inc., with capital of $140,000, employing fifty hands in the production of gold, silver and plated jewelry, Joseph Finberg being president and treasurer of the concern; the Flagg Manufacturing Co., of which A. B. Flagg is president and treasurer, with capital of $25,000 employing fifty operatives in the manufacture of belt buckles, cases and novelties; the General Plate Co., with capital of $150,000, employing one hundred hands in the manufacture of rolled plate, R. Grinnell being president, L. W. Jones, treasurer, and R. Willard, secretary, of the corporation; A. D. Gobin & Co., owned by Peter Dondley and Owen H. Corrigan, producing gold jewelry; The H. W. K. Co., with capital of $100,000, employing fifty hands in the production of men's jewelry, J. L. Wiggmore being president and treasurer, and G. E. Kissick, vice president and secretary; the W. J. Hanna Co., owned by W. J. Hanna, producing pen-knives; J. T. Healy & Son, owned by Eugene C. Healy, employing thirty in the manufacture of gold, silver and plated beads; The A. S. Ingraham Co., with capital of $20,000, producing chemicals, paints, varnishes, and electro plating and of which A. S. Ingraham is president and treasurer, and E. P. Hickoy is secretary; the Marathon Co., with capital of $200,000, employing 100 operatives in the production of jewelry, S. M. Stone, being president, and H. E. Robinson, treasurer and secretary; Moore Brothers, a partnership which includes Thomas H., John F., and Charles E. Moore, employing fifty hands in the manufacture of silver novelties; the R. & G. Co., Inc., one of the city's large industries, with capital of $350,000, employing upwards of 100 hands in the production of jewelry, C. L. Watson being president, and E. L. Gowen, treasurer; The Robbins Co., with capital of $225,000, employing 250 in the manufacture of jewelry, George F. McIntire being president and treasurer, F. A. Chace, Jr., vice president, and Frederick Schwinn, general manager; the Sinclair Flanders Co., employing fifty hands in producing bag frames and jewelry, Leon M. Flanders being president, and David Sinclair, treasurer and secretary; the Sinclair Marks Co., with capital of $24,000, employing fifty operatives in the manufacture of bag frames and metal novelties, David Sinclair being treasurer and secretary of the concern; the Smith, Richardson Co., owned by C. D. Blaikie, employing fifty hands in producing burnishing machines and chains; So-Lo-Jack Co., Inc., manufacturing automobile jacks, Stephen Rioux being president, Stephen H. Garner, vice president, and Edward F. Leach, treasurer; C. O. Sweet & Son Co., employing forty operatives in the production of bracelets, bar pins, brooches, cuff pins, and link buttons, Ervin V. Sweet being president, and Charles O. Sweet, treasurer and secretary of the concern; The Thomae Co., with capital of $300,000, employing 150 hands in the production of sterling silver novelties and jewelry, Arthur M. Briggs being president, C. L. Watson, vice president, Richard F. Crawford, treasurer, and Fred E. Briggs, secretary; Charles Thomae & Son, Inc., manufacturing gold and silver

novelties, and of which Charles Thomae is president and treasurer, and John H. Harmstone, vice president and secretary; and the Tower Mfg. Corporation, with capital of $500,000, empolying 200 in the production of radio head sets, F. S. Tower being president and E. T. Isaac, treasurer and secretary.

In 1927, there were 139 manufacturing establishments in Attleboro, representing a capital investment of $22,568,585. The total value of all products manufactured in the city was $28,799,791, of which jewelry, valued at $16,909,528, constituted 58.7 per cent. Other leading products manufactured in Attleboro in 1927, were cotton goods; silversmithing and silverware; textile machinery, and tools. The average number of wage-earners employed in all manufacturing industries was 5,540, of whom 2,721, or 49.1 per cent, were employed in the manufacture of jewelry. The total amount paid in wages during the year was $6,916,847, of which the wage-earners employed in the manufacture of jewelry received $3,579,077, or 51.7 per cent.

CHAPTER XV

THE CONTRIBUTION OF THE TOWNS OF BRISTOL COUNTY TO THE MANUFACTURERS OF THE BAY STATE

Not only is Bristol County an outstanding geographical division in that its industries house a greater number of cotton spindles than any county in the world, but it is also the center of jewelry production, in which field it takes high rank, the products of Attleboro and North Attleboro alone reaching an annual value of about $40,000,000.

With approximately 850 manufacturing concerns located in the four cities and sixteen industrial towns of the county the annual value of commodities approaches $350,000,000.

ACUSHNET, BERKLEY, AND DARTMOUTH

The little town of Acushnet has never been noted for large industries, but on the site of the Acushnet Saw Mill Company's plant a wool-carding mill was built in 1818; Shadrach Davis manufactured nail-kegs in 1836, and Jonathan P. Lund and Charles W. Morgan built a paper mill in the town in 1840. Cotton factories on the river have been those of White Brothers, Ansel White, Taber's Mills, and the Whelden plant. In 1874 the Cushman Box factory was established, and when destroyed by fire in 1904, was rebuilt, furnishing employment to sixty men.

Berkley's only industry is the box and box shook factory of L. P. Churchill Company, Inc. A. E. Churchill is president, B. O. Jones, treasurer, and D. B. Jones, clerk of the corporation.

The Fall River Cement Construction Co. operates a branch, at North Dartmouth, where concrete blocks and bricks are produced, while at South Dartmouth, the New Bedford Battery Co., Inc., produces storage batteries, at its factory there. The latter concern has capital of $41,000, George W. Kenworthy is president, Walter F. Douglas, treasurer, and John E. Watson, clerk.

THE INDUSTRIES OF DIGHTON

In 1806 the Dighton Manufacturing Co's. cotton factory was built on Three Mile River, at Dighton Upper Four Corners, in the town of Dighton, now the location of the L. Lincoln & Company plant, and a few years later a foundry and machine shop were erected for the construction of cotton-spinning and cotton-weaving machinery. The latter units were leased, in 1843, to D. S. Dunlap, who converted them into a woolen plant.

In 1814 the Wellington Cotton Company was organized at Dighton, with $90,000 capital and was operated under various names until 1845, when the factory was burned. In 1822, David Perry built a machine shop which later was operated as a tack factory.

In 1840, Joshua T. Williams erected a lap mill, and later Simeon Williams operated a sawmill, and J. T. W. Reed, a saw and grist mill.

In 1845 Nathaniel Leonard & Son established a tack factory. The site of the present plant of the Anchor Color and Gum Works was formerly

occupied by a brick cashmere mill, built in 1862, which was destroyed by fire, but subsequently rebuilt and occupied by William Cobb for the manufacture of furniture. Later, the plant passed into the hands of the Albion Lead Company of Taunton and after another fire, a new building was erected and John C. Jessup operated it as a color works. Mason, Chapin Company of Providence, R. I., later purchased it and manufactured water colors. In 1900 Arnold, Hoffman Company, of Providence, R. I., bought the property and when fire again visited the plant in 1906 and partially destroyed it, the structure was rebuilt and is today occupied by the Anchor Color and Gum Works, in the manufacture of water colors, soap and corn starch products.

The concern is capitalized for $25,000, and employs seventy-five operatives, William H. Hayward is president, Edward M. Johnson, treasurer, and John R. Gladding, secretary.

In 1850 Cabot and Lorenzo Lincoln established the firm of C. M. & L. Lincoln and began the manufacture of paper, leasing the premises formerly occupied by T. S. Dunlap's woolen mill. Upon the death of C. M. Lincoln, in 1856, the firm became known as L. Lincoln & Co. The plant was operated until 1881, when it was burned, but L. Lincoln & Co., rebuilt on Three Mile River, and the concern is still engaged in the manufacture of textile papers, thirty hands being employed. The present owner is E. Ellsworth Lincoln.

In 1876 Messrs. G. C. Francis, George Horton, Stephen H. Pierce and John Hinds established the Dighton Stove Lining Co., which was reorganized and incorporated in 1882, with $25,000 capital, selecting as a site for the plant a location directly opposite the celebrated Dighton Rock, and on the bank of the Taunton River, but a few miles from Mount Hope Bay.

The Groveland Foundry Company was organized in 1882 to manufacture stoves and ultimately was taken over by the Century Stove Company, which operated it until the buildings were burned in 1900.

A TWENTIETH CENTURY TEXTILE ROMANCE

An industry which lingered as a family craft until long after the colonies had achieved independence was the art of dyeing and finishing textiles, but, as the manufacture of cloth became specialized on a workshop basis because of the introduction of water power and mechanical improvements, it ultimately became a factory industry in this country, as in England.

Only a little more than a quarter of a century ago two Massachusetts men, traveling along the highway from the railroad station, on a mild Sabbath morning, in January, 1901, reached a little old yellow mill, time-worn and dilapidated, erected on a bank of Three Mile River, in the village of North Dighton, in the town of Dighton.

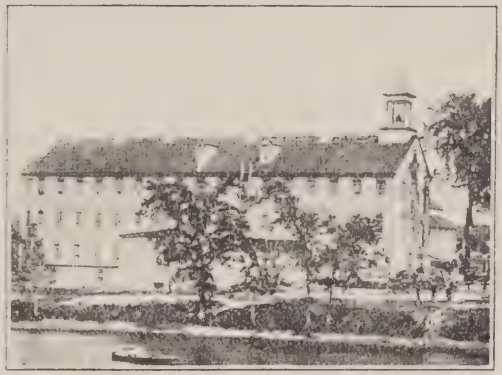
It is constantly being driven home upon us that in the heyday of our supremacy this and that municipality was the seat of a commanding industry, but that for one reason or another the former greatness has departed and only decay, failure, despondency and despair remain.

This picture was true in this instance, for here, a hundred years before, had been born the bleaching industry of Massachusetts, and one might say of New England, as the original company that started on Three Mile River, was a leader in its day.

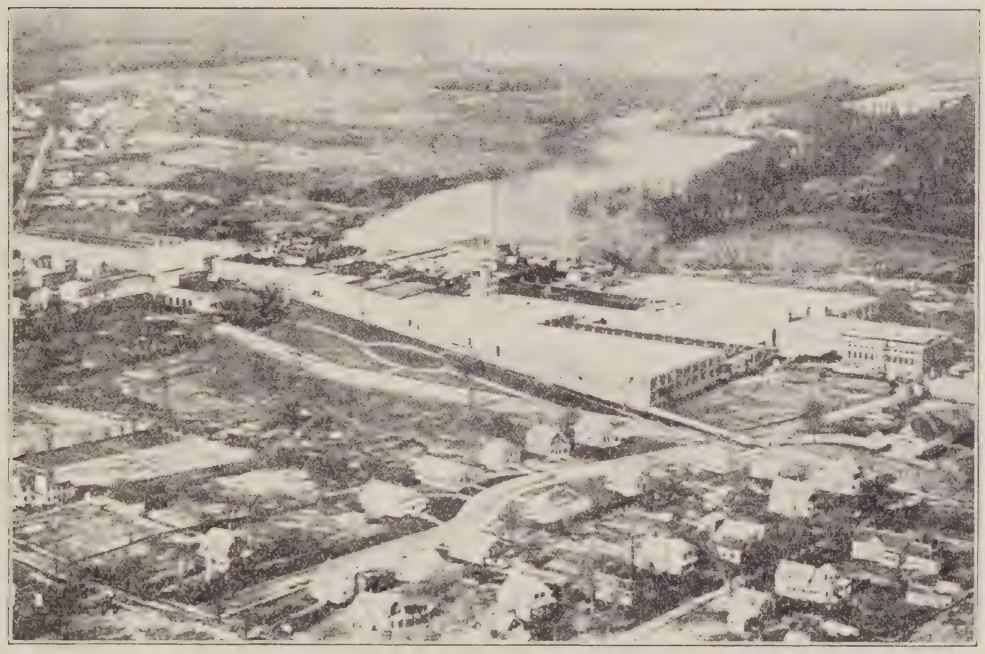
In 1901, the town, with its shabby houses and unkempt highways, reminded one of Goldsmith's "Deserted Village." But to Joseph K. Milli-



MOUNT HOPE FINISHING COMPANY
Here, in 1812, the first attempt was made in New England to chemically bleach cotton cloth



THE CENTURY-OLD MILL
Occupied in 1901 by the Mount Hope Finishing Company



MOUNT HOPE FINISHING COMPANY, NORTH DIGHTON
1928

ken and his uncle, Joseph F. Knowles, the old mill-dam, overflowing with a wealth of water as pure and as clear as crystal, sang a song that was anything but prosaic and uninviting.

They saw reflected in the sparkling stream the romance of a great industry, one destined to become within two score years the largest bleachery and dye works in the United States. Within six months after that visit, the century old mill, where, in the dark days of 1812, the first attempt made in New England to bleach cotton by chemical process was undertaken, blossomed forth as the nucleus of The Mount Hope Finishing Company, with J. K. Milliken as one of its founders and its first treasurer and manager.

In 1875 the property had been bought by Stafford & Company but in 1885 William Mason purchased the plant and operated it for ten years as the William Mason Manufacturing Company and for a short period afterward it was known as the North Dighton Cotton Company. In 1898, when the New England Cotton Yarn Company was organized, the buildings were included in the properties absorbed, but the concern not caring to occupy it the machinery was dismantled, two old boilers and the water wheels being the only equipment left.

Born in the historic city of Salem, Joseph K. Milliken inherited that business ability which distinguished so many citizens of that community in the earlier and later years of its destiny when they reached out to command the markets of the world. Removing to New Bedford in his childhood, he was reared in a manufacturing environment which inspired him to devote his life to industrial pursuits. Gaining his early training, after his college years in the plants of the Dunnell Manufacturing Co., of Pawtucket, R. I., and the Hathaway Manufacturing Co., of New Bedford, he early set to work to become a builder, a creator, rather than a follower, and the turning point in his career came at the beginning of this century when he, and his uncle, strategically located the Mt. Hope Finishing Co., in the heart of Bristol County, where today there are more active cotton spindles than in any other county in the world.

Furthermore, the adjacent county of Providence, in Rhode Island, ranks second among geographical divisions in spindlage, the two counties having upwards of 9,000,000 active cotton spindles, and the Commonwealth of Massachusetts leading all states in the Union in extent of spindlage, with North Carolina and South Carolina ranking respectively second and third.

Not only is the Mt. Hope plant ideally located from the point of an unfailing water supply, both quality and quantity being prime requisites in finishing textiles, but its nearness to ocean transportation enables it to guarantee the best of service to converters whose cloth is woven in southern mills.

Two spur tracks leading directly to the doors of the plant, and a fleet of more than a dozen trucks, combine to increase efficiency in expediting orders, and decrease transportation costs, while the corporation, in addition to maintaining an extensive office in New York City, caters to the southern mills by operating a branch office, in Norfolk, Va.

The 191 acres of land owned by the corporation, at North Dighton, twenty-six of which are devoted to plant activities, fifteen or more to yard space and 150 to a model farm, provide this manufacturing enterprise with terrain possessed by few Massachusetts corporations. Those who attempt to compare this veritable giant of the twentieth century with the puny, little, yellow mill of one hundred years ago find themselves in a

dilemma. Both within, and without the plant, the transformation is complete. The original Corliss engine, a wonder in its day, installed on the original foundation and the obsolete boilers have given way to a battery of oil burners, electric generators and mammoth turbines. The ancient water, steam and sprinkler pipes have been superseded by an elaborate net work of pipes and valves which if laid end on end would equal the Atlantic cable in length. The elevated tank, designed to provide water pressure for the original mill should fire occur has been supplanted by a modern engine house equipped with motorized apparatus.

The twenty-six acres of manufacturing space are housed in long and low buildings, mostly of reenforced concrete, while those devoted to storage purposes are of brick and wood, the scientific saw tooth roof construction and the mammoth windows in the manufacturing units, permitting the maximum amount of sunlight and air to permeate every inch of the mill.

The initial output of from 150,000 to 200,000 yards of cloth received, processed, delivered and invoiced before December, 1901, (the end of the first six months of operation) seems insignificant when compared with the average production of 3,000,000 yards a week today.

The 11,000,000 gallons of water required every twenty-four hours to process the 10,000,000 yards of cloth that are constantly passing through the operations at the plant would provide a city of 220,000 souls with its water supply for an equal length of time.

SOME FIGURES APPLYING TO THIS GIGANTIC PLANT

One obtains some idea of the immensity of the Mt. Hope plant when it is realized that a power unit, costing $1,000,000, supplies the corporation with power, heat and light at an annual maintenance cost of $500,000.

Interesting are the methods by which the engineering department of the company has reduced the cost of production by eliminating unnecessary time and labor in the handling of the millions of yards of cloth that reach the plant.

Open area ways were roofed over, communicating passages relocated to make lines of travel more direct, floor levels changed, and ramps from floor to floor and between buildings were introduced, thereby eliminating elevators and hydraulic lifts. Electrically-operated tractors have replaced the old-time baggage trucks and wheeled boxes laboriously propelled by hand. Immaculate cleanliness exists in every department, the company expending approximately $500 per week to keep its mill in a satisfactory condition. A huge vacuum cleaner visits every room once a week, removing specks of dust from floor, walls and ceiling, while a corps of painters is employed to constantly inspect and repaint buildings.

The space devoted to the storage of grey goods amounts to 131,365 square feet, while that devoted to finished goods covers 124,069 square feet. In addition, 46,530 square feet are devoted to the storage of drugs, such as dyestuffs, chemicals and bleaching powders, 54,454 square feet to the storage of boxes and soap, and 69,259 square feet to the storage of machinery and stock. So complete are the facilities within the plant for the conduct of its business that there are two floors devoted to a hardware store.

SOME REASONS FOR THE SUCCESS OF THE COMPANY

By research and constant attention to the problems of the converter, the company aims to win for a great industry the prestige in the world of art once accorded it by the ancients.

Located in the peroxide building, where the company manufactures hydrogen peroxide, chemick and other bleaching solutions, is a completely equipped chemical laboratory, where intensive research on the subjects of dyeing, bleaching and finishing is conducted. In addition, there is the color-testing laboratory, where all dyestuffs are tested before use. Here, too, dyed fabrics are submitted to rigid light tests in order to ascertain the fastness of their colors. In still another section is an experimental laboratory, where practical experiments are made on samples of cloth, in order that results may be checked up before a whole piece is submitted to processing, or experiments in new finishes are conducted and studied without interfering with regular operations. It is in these departments, and in the forty odd inspections given to cloth in process, that the secrets of unusual finishes have been evolved.

Not only did J. K. Milliken and his associates build a twentieth century textile giant in North Dighton, but they made an investment in health and happiness for their employes, which, next to the good name achieved by the corporation in its chosen field of production, is perhaps its greatest asset.

Macadam roads, an electric lighting system, the introduction of gas, city water from the Taunton supply, an up-to-date hospital, milk, poultry and market gardening units, a club house with bowling alleys, billiard tables, shower baths, locker rooms, a ball field and tennis courts, bungalows and cottages, parks, landscape gardening, a clambake pavilion—all these as well as other community enterprises have been launched and built by the far-seeing executives of the Mount Hope Finishing Company. From year to year as new lines of goods with appeals to popular favor have come upon the market the Mount Hope Finishing Company has promptly seized the opportunity to finish them until today the mechanical equipment is such that it can care for a greater range of fabrics in white, black and colors in cotton and in silk than any competing unit. Its capacity has grown apace, being more than ten times as great as originally anticipated a quarter of a century ago.

ATTENTION GIVEN TO HUMAN PROBLEMS

Perhaps it is in the homes of the employees of the company that one can best sense the spirit that pervades the plant and the village. Today, it owns one hundred and seventy-five houses, and in only a few instances is there any duplication in architecture. They are mainly of bungalow or cottage type and, while some are ostensibly more costly and elaborate than others, each has an inviting entrance, a well-kept lawn, a little garden with attractive flower beds, and is located to the best advantage along the fine concrete and macadam highways which run through this model village. They are rented to employees on a competitive bidding basis, which enables a worker to make his own price. Those interested in securing a vacated house—or a new one—assemble and bid up the rent. In this way the person making the highest bid obtains the house at his own estimation of its worth. Rents range from $1.25 to $7.00 per week. When sickness, death or forced unemployment bring trouble and hardship, there is no unsympathetic landlord to threaten eviction for non-payment of rent.

In 1901, when the company was founded, the only macadam road in Dighton extended for about a mile on the highway from Taunton to Providence. The officials of the company worked for improvements, and in time succeeded in obtaining appropriations from the town for the construction of other macadam highways. Much of the construction of the

fine roads which now intersect North Dighton has been made at the expense of the company. In addition to building and maintaining these arteries, the company furnishes at a nominal sum water and street lighting for the whole town.

The company's model farm of 150 acres is entirely under cultivation. A herd of 78 Holstein cattle provides 650 quarts of milk per day, all of which is sold in North Dighton and Taunton, and 1,000 hens are kept in the poultry department.

Upwards of 1,300 employees are carried on the company's payroll. H. H. Crapo is president, Joseph K. Milliken is treasurer and general manager, and Albert R. White, assistant general manager, of this outstanding Bristol County textile concern.

Today, the Mount Hope unit is unrivalled in efficiency and capacity—another outstanding example of what can be done in Massachusetts when business-like management, vision, courage and executive capacity are brought together in an industrial enterprise.

In 1908 the Crossman Tack Company was established. Hamilton Brothers manufacture tin capped lining and saddlery nails in Dighton, the partnership being made up of Edward and William Hamilton, and the Harodite Finishing Company engaged in the bleaching, dyeing and finishing of cotton textiles is today one of North Dighton's sizable industrial units, employing 100 operatives and being capitalized for $100,000. Its officers are D. D. Stone, president, N. H. Friedman, secretary and treasurer, and N. H. Friedman, vice president.

THE AMES SHOVEL ACCEPTED AS LEGAL TENDER

The town of Easton has been celebrated as the seat of the manufacture of shovels and tools for more than a century and a half. In 1787, Eliphalet Leonard introduced steel manufacture there, and as early as 1792, the manufacture of linseed oil was begun in the town, and for a number of years thereafter, from an annual stock of 3,000 bushels of seed, as many gallons of oil were produced.

Capt. John Ames laid the foundation of the Ames family fortune when he began the production of shovels, in East Bridgewater, in 1774, which was transferred by his son, Oliver, to Easton, in 1803, where it has since remained. When the call came for Minute Men, in 1776, the plant was closed and remained inactive during the Revolutionary war.

In 1814, Oliver Ames, who was a native of West Bridgewater, began the manufacture of cotton goods, and later the production of cotton machinery, in Easton, but the enterprises were destroyed by fire a few years later, and he then entered with enthusiasm upon the manufacture of shovels and spades at North Easton and West Bridgewater, associating himself with his sons, Oakes and Oliver, Jr., in 1844, under the name of O. Ames & Sons. The senior Ames, in addition to valuable improvements in processes of manufacture, and in the forms of different parts of the implements made by him, was an inventor of many useful devices, including the furnace water-back and the iron wheel-tub, and on March 5, 1827, he was granted a patent on a machine for making shovels.

The growth of the concern under his sons was remarkable, production increasing between 1845 and 1870, from 20,000 dozen to 120,000 dozen, and manufacture being stepped up from 5,000 shovels and other utensils a week in 1845, to 30,000 per week in 1870. Additional shops were established in Braintree, Canton, Worcester and Ayer, and in 1864 the concern was reorganized as the Ames Plow Co.

The shovel business prospered because of the superior quality of the product, and in the development of the West there are two authenticated instances where Ames shovels were accepted in place of legal tender.

Oakes Ames, born in Easton, January 10, 1804, early gained a thorough knowledge of the shovel business, became overseer of the factory, and, in 1862, was elected to the 38th Congress, and re-elected to the four succeeding Congresses. Prior to 1864, that body had attempted, by offering land grants and other inducements, to persuade men of enterprise and vision to build a railroad, through the great central plains, and thus connect the East with the Pacific. Urged by President Lincoln and others, Oakes Ames undertook this hazardous and stupendous work, risking his entire fortune in the enterprise, and although the difficulties seemed unsurmountable, they were conquered and on the tenth of May, 1869, the rails of the Union Pacific and the Central Pacific were joined—seven years earlier than the terms of the contract specified, and in the carrying of the mails and commodities this artery of transportation was of inestimable value to the American people, as well as to the government. Then came the muckrakers, and the claim was made that Mr. Ames had interested Senators and Congressmen in the Credit Mobilier, the construction company that was formed to prosecute the work of building the road, for the ulterior purpose of influencing their action in legislation. Up to that hour the honor and integrity of Oakes Ames had never been impugned, and those who knew him best gave no heed to the charge of corrupt intent on his part. The legislature of Massachusetts subsequently passed resolutions of gratitude for his work, and faith in his integrity.

Oakes A. Ames, his son, early gained knowledge of shovel manufacture and after serving as superintendent of the plant for many years, became president of the corporation.

Oliver Ames, son of the senior Oakes Ames, ultimately became a member of the firm and later served as Lieutenant Governor and Governor, of Massachusetts. Frederick Lothrop Ames joined the firm, in 1863, and in 1876, was elected its treasurer, later becoming actively interested in railroads and other enterprises.

In 1836, Draper Ruggles, Joel Nourse and John C. Mason began the manufacture of agricultural implements in Worcester, being succeeded by Nourse, Mason & Co. This firm found the cast-iron plow a rude and imperfect implement; they left it so nearly perfect in point of efficiency and convenience as to render it hardly susceptible of further improvement, and twenty years after they started business they sold annually 30,000 plows, of 150 different types and models. In 1860, Oliver Ames & Sons bought the business. At that period, the famous shovel and spade concern was operating its shovel factory at North Easton, forge shops in West Bridgewater, Canton and Braintree, the agricultural implement unit, in Worcester, and a hay cutter factory, at Ayer.

ITS GREATEST DEVELOPMENT MADE IN THIS DECADE

The present plant in North Easton was built for the most part between 1850 and 1875. In 1927, the officers of the company secured Stone & Webster, Inc., which concern had become financially interested in the company, to undertake a comprehensive survey and analysis of the production and marketing factors with the result that in 1928 a decision was reached providing for the concentration of manufacturing operations at two points—the eastern unit to be located in North Easton, with a second in the middle west. In this effort, William A. Ready, president of the Nation-

al Co., of Cambridge, and a graduate of Massachusetts Institute of Technology, was called upon by Stone & Webster, Inc., to prosecute the engineering study, and at its completion he was chosen president of the corporation. At that time the company was operating seven plants—four blade factories and three handle mills, located in North Easton, in this state and in Pennsylvania, Missouri, Maine, Indiana and Texas. The decision to concentrate the greater part of the production in Massachusetts meant the erection of a complete new shovel plant at North Easton.

It was believed for a time that a single plant located in the Middle West, would serve the Ames customers to best advantage, but further analysis proved that the manufacturing advantages of New England were so great that the main plant should be located at North Easton.

In 1928 there was begun the erection of a new blade factory, one story high, running parallel with the old North Easton plant, 400 by 60 feet, of concrete and asbestos, making it strictly fireproof, and which, when completed, was equipped with the most modern machinery available, rendering it the largest shovel making plant in the world. The main purpose of the addition was to rearrange the layout of line production, and to provide facilities for manufacture with a minimum of hand labor.

In 1901, the company absorbed six other concerns, at which time the firm name was changed to the Ames Shovel & Tool Co. The present capacity of the plant is 6,000 shovels a day for a single shift, which quantity can be tripled when 24-hour operating schedules are inaugurated.

The addition gives the North Easton plant 200,000 square feet of floor space, or nearly five acres. Upwards of 1,200 hands are constantly employed by the concern. The executives' headquarters, which for many generations have been located in Boston, have been removed to North Easton, as a part of the concentration program, and all the eastern executives have taken up their residence there. William A. Ready is president, Albert H. Daggett, treasurer and Victor D. Vickery, secretary.

THE BELCHER MALLEABLE IRON CO.

Easton is also the home of the Belcher Malleable Iron Co., Inc., one of the most progressive units of its kind on the South Shore, being engaged in the production of malleable iron of all kinds and having served New England manufacturers since 1837, making a specialty of water pipe fittings, castings for gears and machinery, while during the last quarter of a century automobile fittings have formed a part of its progressive production program.

C. Bateman Swasey is the treasurer and manager of the corporation, M. G. Swasey, president and L. M. Heath, secretary.

OTHER LEADING MANUFACTURING CONCERNS

A concern that has had a wonderful development in recent years is the Simpson Spring Company, capitalized for $50,000, employing seventy-five, and distributing its carbonated beverages over a wide territory.

Edwin H. White is president, Edwin H. White, vice president, and Frederick L. Howard, secretary, vice president and treasurer of the corporation.

The Charles E. Crofoot Gear Corporation, employs forty or more operatives in the manufacture of gears, Charles E. Crofoot being president, and N. B. Morse, treasurer and clerk of the concern. The Eastern Machine Co., manufactures universal joints, and the Ross Heel Co., with capital of

$150,000, employs 150 operatives in the production of wood heels, E. H. Kennedy being president, and K. E. Kennedy, treasurer of the concern.

Easton had five manufacturing plants in 1927, employing 316 persons to whom were paid that year $367,993 in wages. Stock and materials used by these concerns cost $650,706 and manufactured goods were fabricated valued at $1,513,339.

THE ATLAS TACK CORPORATION, OF FAIRHAVEN

Since the cessation of the whale fishery, Fairhaven's industrial activities have been mainly confined to the operations of tack-making.

The making of tacks and nails in the town had its beginning in the advent of the American Nail Machine Company, a Boston corporation, organized in 1864, which moved to Fairhaven, in 1865, and located in buildings originally used for the manufacture of spermaceti candles. Most of the stockholders of the company were Boston financiers, and included George W. Warren, Lewis S. Rice, Charles H. Brigham, L. L. Tower, and others, who purchased the patents of Messrs. Hoard & Wiggin, the inventors of an automatic-feed nail machine.

The directors were induced by the manager to abandon their original intention of manufacturing cut nails, it being his theory that the product could be made at a lesser price in the West where coal and iron were cheap, than in Massachusetts, to which locality the raw material would have to be freighted. The wisdom of the action of the directors in deciding to engage in the manufacture of tacks and small nails instead of cut nails was exemplified a few years later when the competition from the West crushed out nearly every nail concern in New England.

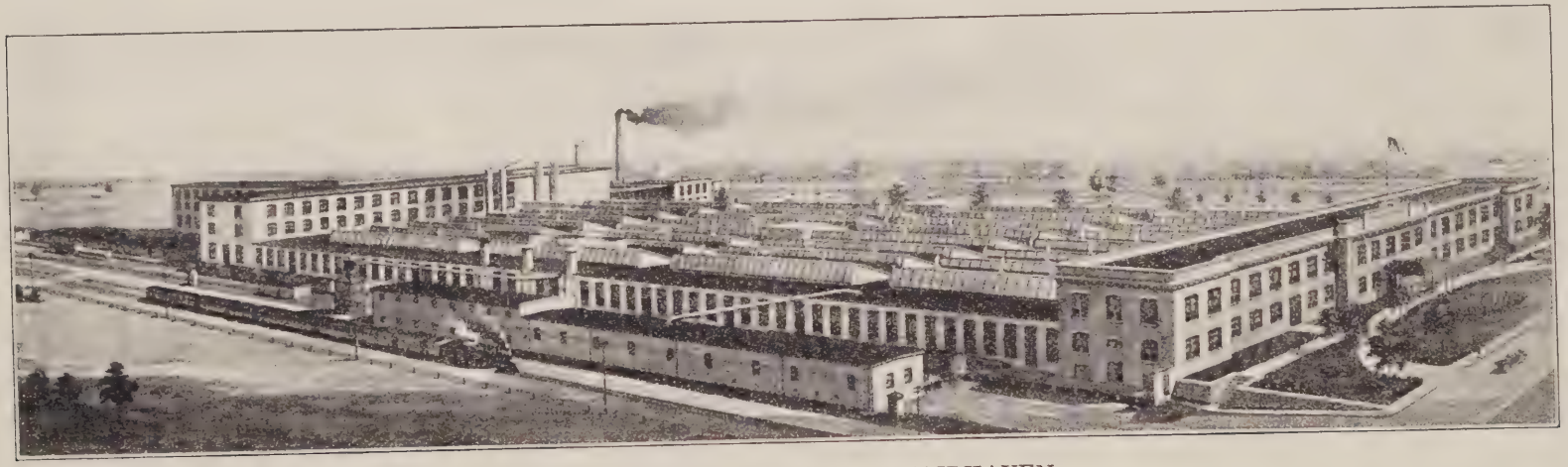
Out of over 1,000 nail machines operated in Weymouth, East Taunton, Bridgewater, Wareham, Providence and Fall River, only two concerns escaped in the fierce struggle for the market so long supplied by eastern nail manufacturers. The two strikes of the New England nailmakers in 1864 and 1865, the first lasting ten and the second eleven months, helped the West to gain control of the Southern and New York markets. Every year prior to the Civil War the Parker Mills of Wareham had shipped 20,000 kegs of nails to New Orleans, but during the strike, nails were sent down the Ohio and Mississippi rivers from Pittsburg and Wheeling, and the markets for which New Orleans was an entry port from the north, were supplied by the western manufacturers.

OVERCOMING EARLY DIFFICULTIES

Excluded by the operation of economic currents from the manufacture of cut nails, the management engaged in the production of tacks and small nails and articles germane to the tack business, but enough of the patented automatic-feed nail machines were built to test the utility of the invention and thus conciliate the speculative interest which constituted the foundation on which the company was organized.

In this departure a sharp struggle was precipitated between two factions in the enterprise. Ignoring the strife between the contending factors, the company pursued its course of establishing and prosecuting the manufacture of tacks, and having built and installed some twenty of the patented nail machines, added forty tack machines and started in as a manufacturer at a most critical time for such an undertaking.

Raw material was high; common iron was 4 cents a pound; Swedish iron 6½ to 8 cents, according to the gauge; copper 45 cents, and zinc, 9



ATLAS TACK CORPORATION, FAIRHAVEN

cents. Soft steel was then unknown. Iron shortly advanced to $10 a ton, but the company had secured sufficient to supply it for a year.

At that time dealers in Boston were strongly prejudiced against new brands of tacks, and it was almost impossible to induce them to buy of a new manufacturer. The management decided to seek the consumers' trade, which resulted in better prices for the goods sold to them.

THE CONCERN INAUGURATES A POLICY OF CONCENTRATION

The policy of the company was concentration and a small concern at Sandwich was bought and the machinery moved to Fairhaven. Next the leather head carpet tack business and machinery of M. M. Rhodes & Sons, of Taunton, were purchased as well as the assets and trademarks of William S. Guerineau of New York, which included the patents of Arby and Jude Field.

Next the business of Martin G. Williams, of Raynham, was bought and the machinery was installed in the local factory. Mr. Williams was the inventor and original manufacturer of chisel-pointed boat nails, used in the building of whale-boats, imported hand-made nails having been employed until Mr. Williams' products displaced them.

Later, the lining nail business of M. M. Rhodes & Sons, of Taunton, was secured and the machinery moved to Fairhaven, and the Star Tack Company, of Assonet, was acquired while a number of machines in the Dighton factory were bought.

On May 1st, 1867, the American Nail Machine Company, with the various acquisitions above mentioned, was reorganized as The American Tack Company, with Charles E. Brigham of Boston, president, and J. A. Beauvais of New Bedford, treasurer.

In 1870, a three-story addition was built and in 1882, a three-story stone building was erected, which later became known as Mill No. 4 of the Atlas Tack Corporation, and is now occupied by Pierce & Kilburn, boat builders. Other structures were added as the growth of the business and the addition of machinery required.

Starting without trade or prestige, the business was gradually built up year by year until it ranked third in size in the country, and its products were known wherever tacks were used.

THE CONSOLIDATION OF 1891

In 1891, a consolidation of the four oldest tack-making concerns was effected in the name of the Atlas Tack Corporation, made up of the following:

Dunbar, Hobart & Co., of Whitman, representing a development of the oldest tack-making business, that of B. Hobart, who started making tacks by machinery in Abington, in 1810; the American Tack Company, which had already absorbed the next oldest tack factory, that of Arby Field, started in 1824, as well as several smaller concerns; the Taunton Tack Company, organized in 1854, by a few practical tack-makers, with original capital of $20,000, which was increased in 1870 to $60,000, and in 1873, to $120,000; Loring & Parks, Plymouth, owning the Plymouth Tack Company and the Island Creek Tack Shop, at Duxbury, established previous to 1842.

The largest concern in the country (chronologically the third) was the Albert Field Tack Company of Taunton, which started in 1827, and which declined to enter the consolidation, but it agreed to sell to the enlarged corporation after it had been organized. That plan was adopted

and the Field Company was later merged in the new corporation. The two Taunton plants of this concern were known as No. 1 and No. 2 mills of the Atlas Tack Corporation.

A FREE TRADE TARIFF UPSETS THE CORPORATION

The year 1892 was the banner year for this country up to that time and prosperity as never before blessed the people. It did not seem likely that a vote of the people to change the Washington administration would occur, but such was the fact, and as a result more than half of our great railroads were forced into receiverships and a large part of our industrial concerns became bankrupt.

The tack business had been protected since 1824 by a specific duty, which practically excluded foreign made tacks and enabled American manufacturers to secure intelligent workmen by paying good wages for their skilled labor.

But the German manufacturers had adopted the American tack machine and had built large factories for the manufacture of tacks, which were being sold in continental Europe and in England in competition with the American tacks that were exported to those countries. Sharp competition was inaugurated between American and German manufacturers, and the English manufacturers were driven entirely from their own markets by the importation of tacks from America and Germany.

Tacks for the lasting machines had to be uniform in size and shape and free from all poor work. This the American manufacturers had learned from experience, and of course the operators generally preferred American tacks to the German product, but the Germans had an advantage in cheap material and cheaper labor, paying less than one-half of what American manufacturers were giving their employees.

The tacks which were used in the lasting machines were made of imported Swedish iron, our great tin plate mills not having at that time rolled any plate for the tack manufacturers. The new tariff under the Wilson-Gorman bill placed a duty of 35% on Swedish iron, but allowed foreign tacks made from the same material to come in for only 25% duty. This gave the foreign manufacturers an advantage over American producers which the Germans were quick to observe and act upon.

As a result of the sharp competition the tack association was disrupted and a fierce struggle for trade was inaugurated that broke prices below cost to the manufacturer. At this critical time, requiring nerve, ability, economy and loyalty, the treasurer of the Atlas Tack Corporation resigned, leaving no alternative but a receivership, a course which was approved by the larger creditors and principal stockholders, and the business and trade of seventy-five years was thus saved from total destruction.

HENRY H. ROGERS COMES TO THE RESCUE

The company continued to lose money, became heavily mortgaged, and, in July, 1900, the properties were purchased at public auction by a representative of Henry H. Rogers, of Standard Oil fame, (a native of Fairhaven), for $200,900, who concentrated operations by the removal of much of the machinery from Whitman, Fairhaven, and Plymouth, to Taunton, where it was installed in the Albert Field factory.

The company was reorganized, the stockholders being composed principally of members of Mr. Rogers' family, and an up-to-date factory was built in Fairhaven. Final concentration of the five consolidated concerns was effected by removing the best machinery to the new plant, while im-

proved up-to-date apparatus was installed to displace all the old and antiquated equipment operated by the original concerns.

In 1903 the entire properties, (with the exception of the new factory), of the Atlas Tack Company were sold at public sale and ceased to be the property of that concern.

The company was owned by the Rogers family until 1920, when it was sold to Boston bankers who in turn placed the stock upon the market. It is incorporated under the laws of the state of New York, with an authorized issue of 100,000 shares of common stock at no par value, and employs 550 operatives.

On February 1, 1928, Nathaniel McL. Sage became general manager of the corporation. Mr. Sage is a graduate of M. I. T., and had filled important positions with the Aberthaw Co., the Bethlehem Shipbuilding Corporation and the Morton C. Tuttle Co., and more recently with the Raytheon Co., of Cambridge.

Under his management, the Atlas concern is developing new lines, and is now producing aluminum and other metal button lines and working into trunk hardware. All of these additional departments are believed to hold great promise.

Nathaniel McL. Sage is president, G. A. Greene, treasurer, E. M. Burgess, vice president, and Ralph Hornblower, clerk of the corporation.

The Fairhaven Iron Foundry Co., with capital of $20,000, employs thirty operatives, in the production of castings, L. W. Morton being treasurer and clerk of the concern, and B. G. Rae, president and the Perry Laundry Machinery Co., capitalized for $250,000 employs fifty workers in manufacturing laundry machinery, Frank Vera being president, Chester A. W. Best, treasurer, and E. J. Perry, general manager. The enterprise was established about seventy-five years ago, and when, on May 12, 1929, the plant was totally destroyed by fire, the executives made plans to rebuild at once.

FREETOWN

In the days of old some ten dams were built on the Assonet River to provide power for the small saw, grist and iron mills, bleacheries and cotton manufactories of Freetown.

On Mill Brook, is located the Crystal Spring Bleaching & Dyeing Co., established and incorporated in 1881, with $125,000 capital, engaged in dyeing and bleaching cotton piece goods, and employing 150 operatives. John Thwaites is president and treasurer of the corporation.

In 1910 the Puritan Mills, owned by the Swiss Textile Co., were established, in the village of Assonet, being incorporated three years later, with $98,000 capital, since increased to $129,000, and now employing fifty operatives in the manufacture of absorbent cotton and sanitary napkins. Daniel Melbane is president and treasurer, and P. J. Stevani, secretary.

THE MANUFACTURES OF MANSFIELD

The first mining for coal was carried on by Col. Ephraim Mansfield, at East Mansfield, in 1736, and just a hundred years later the first company to extract coal from the local mines was formed, under the name of the Mansfield Mining Company. A 40-foot shaft was sunk, but coal was not found in quality nor in sufficient quantity to encourage the stockholders to proceed. The agitation for mining coal has been kept up intermittently since, many experts claiming that excellent coal reserves exist in Mansfield.

In 1814 the Mansfield North Cotton Mfg. Company was formed.

In 1844, Gardner Chilson, of Boston, invented and patented an air warming and ventilating furnace which won him the prize medal at the World's Fair, in London, three years later. Chilson, a native of Connecticut, served an apprenticeship in pattern and cabinet making in the Worcester County town of Sterling, and after establishing himself at Providence, R. I., removed to Boston, in 1837, where he engaged in business. On September 24, 1854, he patented a radiator in the form of a tapering cone, and applying the principle to his warm air furnace, manufactured upwards of 20,000 at a plant he established, in Mansfield. He also patented this invention in England and France.



GARDNER CHILSON
of Mansfield
Inventor and manufacturer
of the famous Chilson fur-
naces and ranges

Four years later he invented and patented a cooking range, with a double oven, and self-regulating flue plates, and, in 1862, he patented an attachment for regulating fire drafts, consisting of a combined ventilator and damper, operated by a single movement of a crank. In 1865 he invented a corrugated radiating cone, resting on a fire-pot, surmounted by a broad, and curved radiating disc or reflector, which formed the top of the stove, and which was generally used for years thereafter in all railroad cars, as well as in offices and factories. He also produced a parlor stove, and a later type of kitchen range, all of his inventions being manufactured in the Mansfield plant, which consisted of a main factory, 200 by 123 feet, and another building 110 feet in length, having a superficial moulding area of 18,000 square feet. Here he employed 100 hands.

From 1866 to the late eighties, basket making, soap manufacture and straw-hat production constituted the principal industrial activities of Mansfield.

George A. Robinson began in the sixties, the manufacture of cutlery, succeeding Robert McMoran and Robert Fulton, who had commenced the production of knives and shoemakers' awls, in 1842, and who dissolved partnership, in 1861. A new factory was erected at West Mansfield, which ultimately was purchased by Robinson.

In 1874, Simon W. Card established S. W. Card & Company and twenty years later the concern was incorporated as the S. W. Card Manufacturing Co. In 1913 the Union Twist Drill Company of Athol purchased the stock of the corporation and has since operated the Mansfield unit under its original corporate name, about 300 employees being engaged in the production of taps, dies, and screw plates.

The Shields Foundry Company was established at Mansfield, in 1885, by Patrick Shields, of Easton, who began the production of malleable iron. Subsequently he changed his plans and gray iron alone has been manufactured since, stove castings for cooking and heating apparatus being the principal products.

The concern was incorporated in 1897 and is owned by two citizens of Mansfield—George C., and Arthur E. Shields.

In 1890, the Avery Japanning Company, was established and was incorporated in 1917, being the only leather concern in Mansfield. Seventy-five hands are employed in the production of patent leather, and in japanning and finishing leathers, Ellery Peabody being president and Maxwell J. Lowry, treasurer.

MANSFIELD CONCERNS ESTABLISHED THIS CENTURY

The town's greatest growth has come within the past twenty-five years during which period there have been established practically all of the present-day manufacturing concerns—still more evidence that Massachusetts municipalities are not losing, but rather gaining industries.

In 1903 the Bay State Tap & Die Company was organized by Hall, Lincoln & Williams for the manufacture of taps, dies, screw plates and twist drills, and today 175 hands are employed. Charles E. Hall is president, Frank S. Shepard, treasurer, and Charles E. Williams, secretary, of the concern, which has capital of $22,000.

In 1905 the Bay State Gold Pen Company started business in the Bliss factory, but as its business increased the concern erected its own plant on East Street, which it occupies today. The company is owned by Paul W. Johnson, and employs twenty-five operatives, in the manufacture of gold pens.

In 1906 the Walter M. Lowney Company, of Boston, erected the modern plant at Mansfield in which it carries on the production of chocolate as auxiliary to its Boston factory, the local concern operating as Chocolate Refiners, Inc., 300 hands being employed. W. H. Raye, is president, E. J. Griffing, vice president, F. W. Brigham, treasurer, and A. W. Murray, clerk.

In 1909, the Mansfield Bleachery was incorporated, and began business in a factory formerly used as a print works, engaging in bleaching and finishing fine cotton piece goods, and silk and cotton fabrics. In 1917 the concern erected a three-story brick structure, 200 by 50 feet, and in 1922, another large three-story unit was added, the company now occupying upwards of two acres of manufacturing space, and having a daily production of 200,000 yards.

It is capitalized for $500,000, and employs upwards of 200 operatives in bleaching and finishing cotton goods. J. F. Bannon is president, W. H. Bannon, treasurer, and L. M. Bannon, secretary.

In 1913, the Harding Mfg. Company was formed for the manufacture of screw drivers and small tools. Albert A. Waterman is president and treasurer, and George R. Ellis, secretary, of the corporation.

Since 1916 the Mansfield Foundry Company, successor to the Ryder Foundry Company, has grown by leaps and bounds, finding it necessary in 1922 and 1923, on account of increasing business in grey iron and semi-steel castings to double its manufacturing space, and erecting at that time another building 90x129 feet, in which was installed upwards of $25,000 worth of new machinery.

The concern is capitalized for $100,000, and employs upwards of 100

men. Hubert A. White is president, and E. Arthur Tutein, treasurer and secretary.

The only Mansfield jewelry unit is the J. L. Cobb Company, formerly the Cobb & Evans Company, which employs sixty hands, the partners being Frank M., and Justin L. Cobb.

The New England Drawn Steel Co., with capital of $210,000, is one of the towns important and growing industries, employing upwards of fifty men in the production of cold finished steel bars, W. B. McSkimmon being president, Charles F. Loughead, vice president, and E. O. Christiansen, secretary.

In 1928, the Standard Rubber Co. began the manufacture of rubber products in Mansfield.

Walker, Davison & Co., owned by Philip S. Walker, employs twenty-five operatives in the manufacture of gold pens.

In 1927 Mansfield had eighteen industries, possessing invested capital of $4,960,558, using stock and materials that year valued at $2,864,818, paying wages to 667 employees amounting to $838,942, and turning out manufactured products valued at $4,661,986.

NORTH ATTLEBORO—CENTER OF JEWELRY PRODUCTION

Oldest among the present-day concerns of North Attleboro is D. Evans & Company, Inc., established in 1805, and with an uninterrupted industrial life of 125 years. Mr. Evans did not become identified with the concern until 1848 and during the Civil War uncounted millions of governmental buttons were made for the United States Government. In 1916, after operating at the Falls for 111 years, the concern removed its plant to the Sommers Building and in 1913 the company was reorganized and today its products are buttons and jewelry. James A. Lavery is president and Clyde R. Barnhill, treasurer and secretary.

In 1830 the Price shop was built on Mount Hope Street, in what is now North Attleboro. It stands opposite the old Price residence, where lived George Price, who, with Calvin Richards, composed the firm which continued in business for twenty-six years.

Fourteen years later, when the concern was known as Ira Richards & Co., steam power was first introduced, this being the initial installation of a steam engine in that section of the state.

While three water power plants furnished power for such manufacturing units as were located adjacent to the water courses, all others were run by horse power. The local introduction of the steam engine was the signal for all sorts of dire predictions on the part of the populace, and later when the Whiting Company erected its big chimney people came from miles around, confidently expecting it to fall as it was being reared.

S. A. Witherell engaged in the manufacture of gold jewelry in North Attleboro in 1846, in conjunction with a partner. The latter retired two and a half years later and in 1849 Mr. Witherell purchased and rebuilt the factory he was then occupying and at times employed 125 hands.

THE H. F. BARROWS COMPANY

In 1851, H. F. Barrows, who had previously been employed in the establishment of Ira Richards & Company, of Attleboro, engaged in the manufacture of gold jewelry, in North Attleboro. Associated with him were L. A. Barrows and E. S. Richards, the latter having been manager

of the H. M. Richards & Company factory in Attleboro. They employed about 100 hands.

In 1854, James H. Sturdy entered the firm and for three years it was known as Barrows & Sturdy. One of the early companies to engage in rolled plate production, it was the first local unit to institute the semi-monthly payment of its employees, prior to the adoption of the weekly payment policy.

In 1856, the firm was known as H. F. Barrows & Co., when the senior Mr. Barrows' sons, H. F., Jr., and Ira, entered business with him. Today, The H. F. Barrows Co. employs seventy-five hands, is capitalized for $150,000 and manufactures rolled gold chains. Donald A. Barrows is president and Florence D. Barrows, treasurer.

In 1855, H. D. Merritt began business in North Attleboro with J. B. Draper, as Merritt & Draper, and after the death of Mr. Merritt, in 1893, the concern, which had been known as the O. M. Draper Corporation since 1861, when Oscar M. Draper entered it, passed into the hands of W. W. Sherman, L. A. Morse, and Donald Le Stage. In its early days the products included rolled plate, fine gilt and nickel chains, and the concern has been closely identified with the chain manufacturing industry. Today it manufactures staple and exclusive gold-filled patterns, and the company is capitalized for $95,000, and employs 100 operatives. Donald Le Stage is president and treasurer, H. E. Hull, vice president, and F. L. Jones, secretary.

In 1857 V. H. Blackinton began manufacturing a line of jet jewelry in a converted schoolhouse he purchased, at Attleboro Falls, and when it was destroyed two years later he rebuilt and extended his line of production, the present-day unit, known as V. H. Blackinton & Company, being one of the largest concerns in the country engaged in manufacturing society, military metal goods, badges and souvenirs.

Its products are sold throughout the United States and Canada, and the company has executed many large United States Government contracts. H. S. and E. R. Wilmarth constitute the present-day partnership, which employs upwards of seventy-five men and women.

THE BUGBEE & NILES COMPANY

One of the oldest manufacturing jewelry concerns in North Attleboro is the Bugbee & Niles Company, established in 1859, under the partnership title of Smith & Ginnodo, subsequently becoming C. E. Smith & Company, and still later Bugbee & Niles Company, when Samuel H. Bugbee and Gardner H. Niles entered the business, the firm name remaining unchanged to the present. A New York office has been maintained by the company for fifty years.

For upwards of fifteen years the Bugbee & Niles Company was owned and managed by Alpin Chisholm, under whose direction the concern experienced many successful years in the manufacture of high grade gold jewelry. Toward the close of his management the concern successfully entered into the manufacture of high grade watch accessories, and these lines—gold plate, solid gold, and platinum—constitute a large part of its product at present.

The business was incorporated as The Bugbee & Niles Company many years ago, and the present management continued Mr. Chisholm's policies of employee life insurance and a Christmas bonus, and has added the practice of a vacation with full pay to all persons who have been employed



PLANT OF THE H. F. BARROWS COMPANY, NORTH ATTLEBORO, ABOUT 1860



PRESENT PLANT OF THE H. F. BARROWS COMPANY, NORTH ATTLEBORO

by the concern for a year or more. The plant has run at capacity on full time for several years past.

Under the present management the company's product has been broadened to include all that is latest and most fashionable in wrist-watch bracelets, originating the four-fold balanced mesh type, the expando block type, exclusive buckle types with ribbon or leather, on all of which it holds basic patents.

The company enjoys a world wide reputation, its products going to Canada, Cuba, South America, Barbadoes, Europe, and even to far off India.

It employs from 80 to 100 hands and is capitalized for $100,000. I. G. Chisholm is president and H. A. Gardner treasurer and secretary.

The William Coupe Company, Limited, was established in 1865, being the oldest tannery in that section of Bristol County.

R. BLACKINTON & COMPANY

The firm of R. Blackinton & Company was established in 1862, when Roswell Blackinton, Walter Ballou, and Thomas Mann formed a copartnership. The concern originally manufactured book clasps, and during the Civil War made clasps for Bibles used by the soldiers. Mr. Mann retired in 1867, and the firm continued without further change until the death of Mr. Blackinton, in 1906. The Ballou and Blackinton families still continue the management of the business, the partnership being made up of W. B. and H. M. Ballou, J. R. Blackinton, F. S. Ross, and H. R. Morss, and the estate of J. R. Morss.

During the early years a general line of gold-plated chains and jewelry was manufactured, and for a long period the output was almost exclusively of sterling silver. During the past fifteen years a line of 14-karat gold novelties has been developed and upwards of 100 hands are employed.

REPRESENTATIVE CONCERNS TODAY THAT WERE ESTABLISHED IN THE SIXTIES AND SEVENTIES

In 1864, E. S. Richards & Company began business in North Attleboro, later becoming J. J. and J. M. Richards.

J. F. Sturdy's Sons Company was established in 1865 by the late John F. Sturdy. For many years the firm was noted for its chains, but in recent years, the bracelet has displaced chains in the importance of the company's production. The corporation has capital of $300,000 and employs 200 operatives, H. K. Sturdy being president, H. K. Sturdy, Jr., vice president, and F. E. Sturdy, Jr., treasurer.

The Sturtevant-Whiting Company was founded in 1867 under the firm name of S. B. Fisher & Company. In 1897 the firm of Sturtevant, Whiting & Bigelow succeeded the Fisher Company. In 1906 Mr. Bigelow retired and seven years later Edwin Sturtevant left the concern, Fred B. Brigham and Louis Kurtz becoming associated with George A. Whiting, under the firm name of Sturtevant-Whiting Co. Upon the death of Mr. Whiting and the withdrawal of Mr. Brigham, George E. White became associated with Louis Kurtz in the conduct of the business. Mr. White is now president and Donald Le Stage is treasurer of the corporation, which has $40,000 capital and employs thirty operatives in the manufacture of plated jewelry, specializing in the production of costume jewelry.

The firm of E. I. Franklin & Company was established in 1874, by E. I. Franklin and C. W. Fisher. The present members of the partnership are W. G. Franklin, son of the founder, C. W. Fisher, and E. B. Fisher.

The company's goods are marketed throughout this country and Canada, and it employs 125 workers in the manufacture of gold filled and silver jewelry.

In 1871 C. E. Sandland & Son began an enameling business in North Attleboro, the firm being bought, in 1890, by J. E. Draper & Co., which had been established, in 1883, to manufacture jewelry and novelties.

The W. N. Fisher Company commenced business in 1877 under the firm name of W. D. Fisher & Company. After the death of W. D. Fisher the business was continued by his son, under the name of W. N. Fisher & Company. In 1912 the firm was incorporated, under its present name, and is engaged in producing a full line of springs, swivels, and spring rings in rolled plate, sterling silver, and gold. The company has capital of $25,000, and employs fifty men and women at its Attleboro Falls plant. George F. McIntire is president, and W. P. McAlpine, treasurer.

Frank M. Whiting & Company, silversmiths, began business in North Attleboro, in 1878, the concern being owned by Frank M. Whiting at that time.

It was the direct outgrowth of the Whiting Manufacturing Company, which was founded in the town by William D. Whiting in 1840. It has always manufactured a general line of table and hollow ware, confining itself to sterling silver at all times.

The business was incorporated in 1897 and has capital of $150,000, F. L. Whiting being president, and F. A. Howard, treasurer.

In 1879 the late John P. Bonnett established the electroplating and jewelry coloring plant now operated by Oscar Hillman.

NORTH ATTLEBORO CONCERNS FORMED IN THE EIGHTIES AND NINETIES

Cheever, Tweedy & Company commenced business in 1880, under the name of G. W. Cheever & Company, engaging at that time in the manufacture of a line of fine gilt chains, which was subsequently discontinued and supplanted by rolled plate jewelry.

With the entrance of John E. Tweedy into the business the firm name was changed to Cheever, Tweedy & Company.

Mr. Cheever retired from the firm several years ago and John E. Tweedy is the sole proprietor, employing upwards of fifty hands.

In 1882 G. Herbert French and W. H. Riley established the firm of Riley & French to engage in the manufacture of jewelry, and in 1916 the present G. H. French Company was formed when Mr. French retired. Alton H. Riley is now the sole proprietor, and employs fifty operatives in the manufacture of gold, silver and plate jewelry.

W. H. Bell & Company was established in 1890 and began operations in the old Braid Mill Building, a structure which in years past has housed some of the famous North Attleboro jewelry makers of the present day. Twenty-four years ago Mr. Bell moved his business to its present location in Robinsonville. This firm manufactures a complete line of ladies' and gents' gold filled chains and bracelets, and carries on an extensive export business. William H. Bell is the sole owner, and employs forty or more hands.

In 1891, J. F. and C. O. Mason began the manufacture of paper boxes in a small building in the rear of their home, under the name of Mason Box Co. A few girls were employed in this small shop to make boxes for the local jewelry trade. It was in these modest surroundings that the owners adopted their present business policies, and under which a successful enterprise has been developed.

The small shop has grown to two modern factories, one containing 65,000 square feet of manufacturing space, and the other having an area of 50,000 square feet, both being equipped with the latest machinery, much of it designed by the concern and in addition to a complete line of boxes of all kinds, and display cases, the concern operates a leather novelty department, a complete printing plant, and a steel die printing department. Two years after the death of Charles O. Mason in 1911, the business was incorporated. The company specializes in containers for mail shipments, these commodities being distributed by it in every section of the United States, as well as in foreign countries.

In the main factory, at North Attleboro, which is managed by Mr. Rhodes, about 300 operatives are employed, while at the branch plant, in Providence, R. I., 125 hands are carried on the roll. This plant is managed by Arthur A. Weller.

The New York office is located in the Flatiron Building, at 175 Fifth Avenue, and branch offices are operated in eleven of the larger cities of the country.

The Mason Box Co., is well and favorably known as one of the foremost American concerns in its field of production.

J. Frank Mason is president and treasurer, Ellen L. Mason, vice president, and Russell I. Rhodes, secretary, of the $125,000 corporation.

J. H. Peckham & Company, Inc., originators of fine pierced filled jewelry was established by John H. Peckham in 1893. Mr. Peckham and his two sons, Charles S. and William B., are now associated in the business, the firm being engaged in the manufacture of brooches, bar-pins, pendants and bracelets. It employs upwards of sixty operatives. William B. Peckham is president, Charles S. Peckham, treasurer and John H. Peckham, secretary.

In May, 1893, the H. W. Tufts Tool Company was established, and during the World War furnished the government a vast amount of supplies.

In 1897, the firm now known as Paye and Baker Manufacturing Company started business in Providence, R. I., as Simmons & Paye.

Mr. Simmons withdrew in 1900, and when Mr. Baker entered the firm, the present name was adopted. In 1903 the company moved from Providence to North Attleboro and in 1905 it was incorporated.

Upon the death of both partners within a relatively short period, the business passed into the hands of Messrs. J. Noble Shawe, Allan A. Gordon, William H. Ryder, Ambrose J. Morawski and Harry E. Paye, and is now operated by this group.

Mr. Gordon is president, Mr. Paye vice president, Mr. Morawski secretary, Mr. Shawe treasurer, and Mr. Ryder assistant treasurer of this $80,000 corporation, which employs seventy-five operatives.

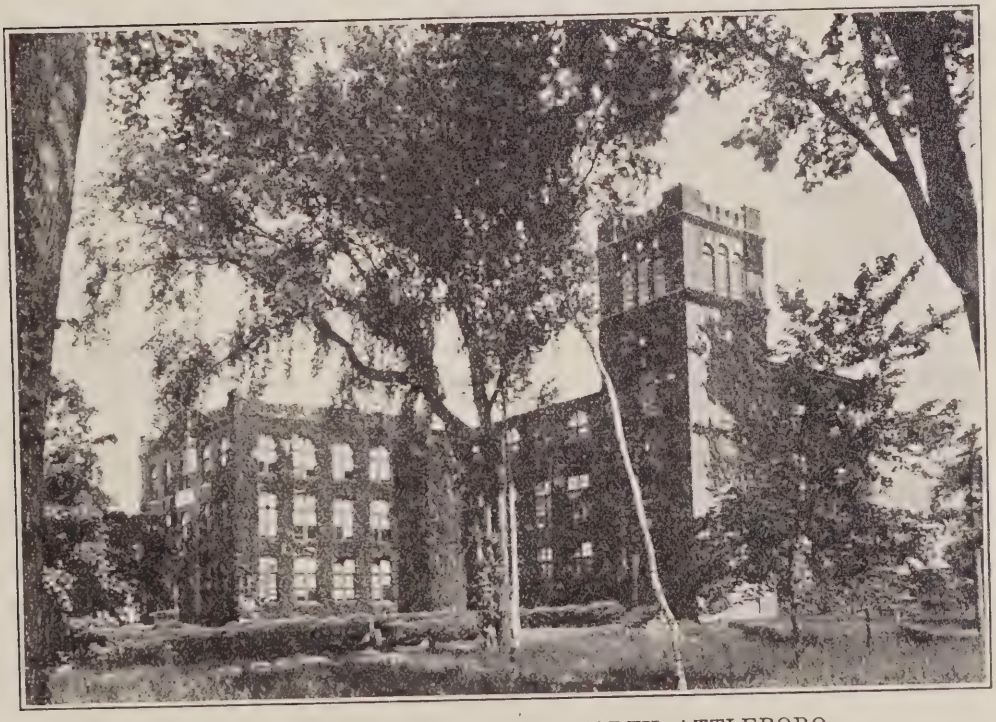
The concern manufactures a line of sterling silver and silver-plated novelties, as well as a full line of hollow ware.

G. C. Hudson & Company, manufacturing jewelers, began business in 1899, the original members of the firm being G. Cheever Hudson, Andrew Morris, Alton H. Riley and G. Herbert French. Messrs. Hudson and Morris have since died and the firm continues under the ownership of Messrs. French and Riley, and manufactures a complete line of jewelry, being capitalized for $40,000 and employing sixty hands. Mr. French is president and Mr. Riley is treasurer.

The firm of T. G. Frothingham & Company, Inc., a recognized leader in the manufacture of gold rings, is made up of Howard R. Grant, Charles



THE PLANT OF THE WEBSTER COMPANY, NORTH ATTLEBORO



MANUFACTURERS BUILDING, NORTH ATTLEBORO

J. Sekowski and Stuart M. Rhodes. The latter is president, Mr. Grant vice president and Mr. Sekowski treasurer and secretary, sixty employees being carried on the company's payrolls.

THE WEBSTER COMPANY

George K. Webster was the founder of the present Webster Company, starting business in the old Whiting Building, where he engaged in the manufacture of plated and gold-front commodities. In 1898, he located in the Whitney Building, and soon outgrowing these quarters, he erected the present Webster factory, on Broadway, and centered his activities upon sterling silver goods exclusively. The concern is one of the largest of its kind in the United States, occupies in excess of 50,000 square feet of manufacturing space and approximately 300 hands are employed.

The company has capital of $175,000. Wallace D. Kenyon is president and treasurer, and R. S. Emerson, secretary.

The Bishop Company, Inc., makers of distinctive optical frames in white gold and gold filled is the only manufacturing unit of this type in North Attleboro, being capitalized for $80,000 and employing seventy-five hands. Arthur S. Bishop is president and treasurer, and Fred R. Bishop secretary.

The company was organized by A. S. Bishop and Frederick R. Bishop about twenty years ago. For the first few years operations were conducted in a small plant in the rear of High Street, but a few years later the concern moved to its present factory.

The company's products are extensively sold in Canada and a number of other foreign countries.

The Le Stage Manufacturing Company, organized in 1915, is an outgrowth of the Barden & Hull Company.

The firm makes high grade jewelry, chains, bracelets, lockets, and other articles, is capitalized for $150,000, and employs upwards of 100 operatives. Donald Le Stage is president and treasurer, and Fred L. Jones, secretary.

In 1915 the Barber Electric Manufacturing Company was incorporated to manufacture general electrical supplies, and during the late war its production was almost exclusively carried on for the United States Government. It has capital of $99,000, and employs fifty hands. H. C. Barber is president, John L. Thompson, treasurer and Ernest A. Upham, clerk.

The firm of Swift & Fisher was established and is still owned by Harry W. Fisher and Joseph H. Swift and manufactures a complete line of religious articles. It operates one of the most complete lines of machinery for making uniform buttons in the country. Among the large list of customers on the firm's books is that of the United States Government, which places many orders with the local concern. Fifty hands are employed.

THE EVANS CASE COMPANY

The Evans Case Company had its beginning about ten years ago as a department of another business and at that time the number of employees could be counted on the fingers of one hand, while it required only about thirty square feet of floor space—but not for long.

From the beginning it prospered and in 1922 was incorporated. That year it carried about seventy-five employees on the payroll and occupied

floor space of approximately thirty-five hundred square feet, the annual sales amounting to $235,000.

This growth and expansion continued from year to year until in 1927, the company employed 375 hands, occupied over fifty thousand square feet of floor space in its own three-story building, and did business aggregating $1,375,000.

At the seasonal peak, a maximum payroll of about four hundred and eighty employees is carried, earning $15,000 a week.

Alfred F. Reilly is president, James Lavery, treasurer, and Samuel Haslam, secretary, of this fast growing concern.

BETWEEN FORTY AND FIFTY PER CENT OF MAGNAN TENNIS RACQUETS ARE SOLD ABROAD

Massachusetts manufacturers engaged in the production of seasonal commodities may well ponder over the record of the N. J. Magnan Corporation, of North Attleboro, manufacturers of tennis racquets. Several years ago the officers of the corporation realized that the business in which the concern was engaged being of a seasonal nature, it would be incumbent upon them to seek a market for tennis racquets which would tide it over the slack period, or else turn to the production of some staple product that would keep the sales up to a figure that would avoid red ink entries. Several allied lines were tried such as golf accessories, snow shoes, hockey sticks, lacrosse bats, etc., but in each case it was found that an entire change in equipment and personnel must be effected, and at the end of the survey the conclusion was reached that the only answer was to look into the markets for tennis racquets in countries where the seasons are the opposite of ours.

What was the result?

Five years ago the Magnan Corporation did not sell a hundred dollars worth of racquets in any country on the globe save in the United States.

Today, the foreign sales of the concern represent between 40 and 50 per cent of the total output, and the company is maintaining twenty-five foreign representatives in the field, and not a week passes that it does not receive inquiries for its products from countries where it is not now doing business.

It will be of interest to those who have hesitated to enter the foreign field because of fear of monetary losses to learn that in five years the Magnan Corporation has charged off less than $25 for bad accounts on its overseas business.

Agencies are now operated by the company in England, Germany, Denmark, Spain, Switzerland, Italy, Austria, Czecho-Slovakia, Poland, The Balkans, Egypt, India, the Straits Settlements, Australia, New Zealand, China, several of the South African states, Chile, Argentina, Brazil, Cuba, Bermuda and Canada.

With capital of $95,000, the concern employs seventy-five operatives. Wallace D. Kenyon is president, Frederick J. Fitzpatrick vice president, R. G. Thackeray treasurer, Charles A. Currie, assistant treasurer, and A. M. Achin, secretary.

OTHER LEADING CONCERNS OF NORTH ATTLEBORO

In the designing, die and hub cutting trade the firm of Straker & Freeman ranks high. The partners are L. E. Freeman, A. O. Straker and V. M. Calkins.

The J. J. Sommer Company, manufacturers of high grade jewelry and rings, is an old established concern, having been formed in 1879 for the manufacture of white stone goods. In 1884 it became the Totten & Sommer Co., and upon the retirement of the senior partner in 1896 the present corporate name was adopted. J. J. Sommer is president and Edmund T. Sommer, is secretary and treasurer of the corporation, which has capital of $100,000, and which employs upwards of ninety workers.

The Charles K. Grouse Company, manufacturers of class and college jewelry, stationery and favors, employs thirty-five salesmen who cover the entire United States. Many colleges and schools deal exclusively with this concern, of which Mrs. Mary A. Straker is president, and Louis E. Freeman, treasurer.

The Nihan Jobbing Company was established in 1918 and makes a specialty of gold and silver soldering as well as soft soldering, doing considerable business for Attleboro and Providence concerns as well as for North Attleboro houses.

The Jewelry & Cutlery Novelty Company, owned by P. J. Cummings, employs forty operatives, and manufactures a complete line of gold, silver and gold filled pocket cutlery for premium uses.

North Attleboro enjoys the distinction of being the home of the Clark Lighter Company, the only local jewelry concern whose stock is listed on either the New York or Curb markets. The Clark Lighter Company is an outgrowth of W. G. Clark & Company, one of the oldest jewelry concerns in the country.

The corporation is capitalized for $400,000, and employs 125 hands in the manufacture of gold, silver and rolled plate and cigar lighters. E. Foster Clark is president, R. R. Wason, treasurer and secretary, and J. F. Clark, vice president.

A report submitted to the New York Curb authorities when the stock of the new company was listed, in 1928, showed that the profits of the concern in 1927 were $400,000.

The Mason-Lenzen Company is one of the town's newer industries and is predicated on the business axiom that goods well displayed are already half sold. Since its formation, the concern has specialized in display novelties, jewelers' show cases and window display trays, telescopes, and cases.

J. Francis Mason is president and treasurer, and J. H. Lenzen secretary of this $25,000 corporation, which employs fifty hands.

The Standard Mill, one of the units of the International Braid Co., is located at Attleboro Falls, where seventy hands are employed in the manufacture of shoe laces, braids and stove wicks, the plant being equipped with 1,500 braiding machines, two boilers, and a water wheel.

The Bannockburn Mills, Inc., were incorporated in 1927, to manufacture jacquard broad silks, bed spreads and draperies. George M. MacKenzie is president, M. D. Gourlay, vice president and secretary, and Earle C. Warner, treasurer.

J. F. Bride & Co., of Attleboro, operate a branch plant, in North Attleboro; M. J. Brohen & Co., composed of M. J. Brohen and C. J. Rancoutr, manufacture engine turning machines, special machinery, and woven wire chains; The Carpenter Die & Tool Co. employs thirty operatives in producing die and hub cutters, J. A. Carpenter being president, S. F. Angell vice president and R. W. Carpenter treasurer; J. O. Copeland & Co., owned by Charles F. Copeland, manufactures jewelers' findings;

William J. Creed is engaged in the production of jewelry; the Doran, Bagnall Co., Inc., employs thirty hands in the manufacture of ecclesiastical goods, William M. Miller being president and Joseph P. Bartley treasurer of the corporation; Glines & Rhodes, owned by A. B. Glines and C. L. Rhodes, are engaged in refining gold, silver and platinum; the A. L. Lindroth Co., owned by A. L. Lindroth, manufactures jewelry; Maintien Bros., Inc., of which George B. Maintien is president and Louis E. Morse, treasurer, are engaged in jewelry production; the Mandalian Mfg. Co., owned by S. G. Mandalian, employs ninety hands in the manufacture of mesh bags; Messrs. Martha & Carpenter, a partnership made up of Eugene Martha and C. T. Carpenter, produces belt buckles, bracelets and novelties; H. D. Merritt & Co. is engaged in the manufacture of jewelry; H. R. Morss & Co., of which Herbert Morss is president, Howard M. Ballou treasurer and Lester S. Wall, secretary, is engaged in the production of table cutlery; the North Attleboro Foundry Co. employs thirty hands in fabricating grey iron castings, John L. Thompson being president, Wallace D. Kenyon secretary and A. B. Cook treasurer; the Presto Cigarette Case Corporation, capitalized for $20,000, employs sixty hands in the manufacture of cigarette cases and novelties, Isaac Wallenstein being president and Ralph Wallenstein, treasurer and secretary; C. Ray Randall & Co., of which Alton H. Riley is treasurer, employs fifty hands in the production of gold, sterling and gold-filled jewelry; Roberts & Pike, a partnership which includes W. T. Roberts and G. A. Pike, manufactures tools and cut dies; and the William White Co., owned by William White, manufactures jewelers' hubs and dies.

OPERATING "GOLD MINES" IN NORTH ATTLEBORO

In 1928, one of the most unique demonstrations of Massachusetts thrift was observed in North Attleboro when passersby noticed men digging around a swamp on Ten Mile River, in North Attleboro, and in still another swamp on the property of the so-called "Company Shops," in the same town.

When it became known they were "digging for gold" some thought they were insane, while others became mildly excited about a real gold mine on the soil of the Bay State.

But neither conjecture was true. As a matter of fact, the diggers represented the Richards Real Estate Trust, of which John E. Tweedy, a manufacturing jeweler, is trustee, and the enterprise, while by no means the outcome of a new idea that had been proposed and laughed out of court many times in the years gone by, is a scientific and methodical, going concern. Some months before this effort was begun, a group of North Attleboro men scraped up some mud from the swamp at the "Company Shops," had it refined and smelted—and then refused to talk about it, but promptly took business steps to develop the "gold workings." within almost a stone's throw of the heart of North Attleboro's business center.

Dried mud from these "gold workings" is sent to the plant of the Attleboro Refining Co., by truck loads, and from there goes, in powder form, to a gold smelting plant, at Newark, N. J.

According to the stories current in the town, the largest deposits of gold are being found in the swamp back of the factories. Here, for scores of years, up to about 1880, the jewelers, whose plants were located in the big buildings, were accustomed to dump the sweepings and other refuse

from their plants, as well as the water from their sinks, into Ten Mile River, which passes under one of the big structures.

Those engaged in working the deposits state the reason why the swamp "pays" better than the river itself is not because more gold was dumped there, for, as a matter of fact, more precious metals were dumped there than directly under and adjacent to the "Company Shops," but rather because the action of the water during the spring floods swept much of the gold downstream. In the swamp, to the contrary, almost everything dumped there in the way of gold and silver remains to this day.

Years ago the concerns had no modern cost-accounting methods; they made no effort to launder the clothing of employees for the sake of saving the gold and silver dust clinging to the material, and they never ripped up old floors and installed new ones for the purpose of recovering from the old timbers the gold and silver ground into them by the shoes of the operatives.

The dollar and cents value of spending real money to prevent tiny gold particles from being lost or wasted in the local factories began to be appreciated about half a century ago, and since then tremendous strides have been made.

Almost every plant has some individual features designed by its owners or foremen and all scrap, even the tiniest pieces, is most carefully saved. Means are taken to prevent the loss of any filings, benches being carefully swept each day. Special apparatus is installed to catch the minute particles dislodged during polishing operations. Sweepings are both carefully preserved for refining and elaborate measures taken to insure getting every particle from the floors. Every sink is trapped, in some places two or three times, to catch the gold that is washed off.

Within the last few years special high-powered vacuum cleaning outfits have been invented to suck the heavy gold or silver particles from factory walls and floors.

Every piece of dry polishing apparatus is carefully protected to prevent gold particles from flying and the screens are reinforced with powerful suction systems.

The work in the Ten Mile River is a bit more complicated than that carried on at the "Company Shops." The mud bottom and sides of the river are carefuly scraped off to a depth of a foot or more. During these operations a big gasoline pump is kept working lower down the stream, sucking the muddy water flowing down the river up into a big vat and after the water has run off, this mud is removed and treated.

The idea of recovering this gold is not entirely new. Citizens of North Attleboro, their memories jogged by the Ten Mile River "strike," are recalling what happened to an old jewelry plant on East Street, where the fire house now stands. As the story goes, this plant burned down after having been in use for about half a century and was never rebuilt.

After standing in ruins for several months a man bought the buildings for the sake of salvaging whatever good material might be left in them. People around North Attleboro were confident he was going to lose money.

The buyer proceeded to burn all the remaining debris on the lot and then the townspeople were unanimous in the belief that he was crazy. However, he calmly gathered up the ashes and sent them away to refining plants. This done, he proceeded to send away cart loads of dirt from in back of the factory, where sweepings and other refuse had been dumped for years and he is reported to have made a small fortune from his operations at this one plant.

THERE WERE MANUFACTURING PROBLEMS IN THE OLDEN DAYS

Massachusetts jewelers, as well as textile designers, of this era, who lie awake nights trying to evolve new ideas that will carry an appeal to the whims of customers, really have no more serious problem than that which confronted their predecessors in the long ago.

A recent exhibit of 817 pieces of jewelry, manufactured in the century between 1780 and 1880, arranged by Charles H. Clark, and shown at a meeting of the North Attleboro Historical Society, all loaned by families in that town, showed styles, craftsmanship and specimens all typical of the different eras in which they were fabricated.

Some of the pieces dated back further than 1780 and among these were a pair of unmatched silver knee buckles worn by George Washington. The interesting story of how he came to be wearing unmatched breeches buckles is a tale of a famous old North Attleboro inn, built in 1670, by John Woodcock and his sons. It was the center of many bloody Indian skirmishes and became one of the garrisons or fortifications that extended from Boston to Rhode Island. It later came into the possession of Col. Israel Hatch, who fought in the battle of Bunker Hill and who was the first postmaster of Attleborough—a fascinating character who kept the mail in a huge sideboard. It was while Colonel Hatch was proprietor of this hostelry, which later was christened "Steamboat Inn," that General Washington stopped on one of his journeys between Boston and New York, probably in 1789. He commented upon the design of Hatch's silver knee buckles, and the inn keeper expressed his admiration for those worn by Washington. The latter proposed that they exchange one buckle and as a result they parted, each wearing an unmatched pair.

General Washington's buckles were long and rounded at the ends, the silver rim being heavily chased. They bore his initials "G. W." in letters of Roman design, which were said to be found on most of his personal possessions. Colonel Hatch's buckles were circular in form, made of silver and set with crystal brilliants of finest quality.

The two unmatched buckles, in the possession of Mrs. Josephine Whitney, great-great-granddaughter of the famous inn keeper, bear mute testimony to the truth of the story. Recently the tradition received added weight as the result of a visit to Mount Vernon by Mr. and Mrs. H. B. Ryder, of Norh Attleboro, who, while walking slowly by the glass cases containing articles that once belonged to Washington, or members of his household, had their attention attracted by a familiar object. In the case before them lay the mate to the buckle which President Washington a century and a half before had whimsically proferred the North Attleboro inn keeper.

The North Attleboro Historical Society has photographed the two buckles in the possession of Mrs. Whitney, and Congressman Joseph W. Martin, Jr., who represents the district in which North Attleboro is located, is endeavoring to discover the final link in the chain—the Hatch buckle.

The jewelry industry of the Colonial period was subject to the same quick changes in fashions and tastes that are apparent in this modern age. Fads and fancies have to be satisfied and the Colonial jewelers were as busy trying to fathom the future whims of milady as are their present day successors.

The era of hair jewelry was followed by the period of butternut products of the 1830s, and by the day of the bogwood jewels, manufactured from a chocolate-colored wood, fashioned as earrings and buttons. Then

came the reproductions of autumn leaves and flowers in two colors of gold, and all the other novelties that have so distinguished the jewelry production of the two Attleboros.

THE TOWN'S INDUSTRIAL GROWTH

The constant and uninterrupted industrial growth of North Attleboro is best revealed in statistical tables. It is now producing jewelry valued at the wholesale figures in excess of $10,000,000 a year.

Consolidations, removals, fires and liquidations have not conspired to reduce the total number of local establishments to any great degree, and a gain of $700,000 in wages paid in the past five years tells the story of progress better than words.

There is a gain of over 200 wage earners in five years. Jewelry alone shows an increase of 300, which makes up for some of the recessions in other directions.

Back in 1916 the jewelry total of the town was $3,355,255 and the value of the entire industrial output was $5,769,678, while wages totaled $1,661,000. Product and wages both show a gain of nearly 100 per cent during the past ten years.

In the decade there has been a net increase of two in the number of new jewelry firms, while "other industries" show a gain of nine.

The figures for the five years from 1922 to 1926, inclusive, follow:

NORTH ATTLEBORO—1922-1926

Years	Number of Establishments	Capital Invested	Value of Stock and Materials Used	Amount of Wages Paid During the Year	Average Number of Wage-Earners Employed	Value of Products
1922	74	$7,536,614	$2,947,677	$2,305,918	1,941	$ 7,451,867
1923	71	*	3,273,489	2,592,604	2,043	8,773,026
1924	75	6,910,650	3,155,699	2,670,853	2,168	8,727,433
1925	72	*	3,876,033	2,691,804	2,128	9,405,548
1926	70	7,797,152	3,975,867	3,007,242	2,256	10,721,915

* Not called for on questionnaire.

JEWELRY

Years	Number of Establishments	Value of Stock and Materials Used	Amount of Wages Paid During the Year	Average Number of Wage-Earners Employed	Value of Products
1926	36	$2,150,537	$1,832,455	1,408	$6,496,963
1925	39	2,043,643	1,655,314	1,344	5,460,190
1924	39	1,889,428	1,649,564	1,333	5,310,259
1923	38	2,109,527	1,613,713	1,219	5,434,564
1922	36	1,804,089	1,319,479	1,141	4,402,786

NORTON

The first mill for fulling, dyeing and dressing cloth in the town of Norton was built by Jonathan Hodges, in 1745. In 1790 William Carpenter set up a nail-cutting factory, and in 1808 the hat-making industry was started there by Ansel Keith and Jonathan Smith.

On the same site Thomas Danforth, Hiram H. Wetherell, Horace B. Wetherell, the Straw Mfg. Company, the Wheaton Mfg. Company and the Norton Mfg. Company operated. The first tannery was established in the town soon after its incorporation and in 1740 Benjamin Copeland built another, which was operated by him and members of his family up to 1845.

In 1758 David Arnold built a tannery there, and exactly 100 years later Austin Messenger began the local manufacture of friction matches, later taking Andrew H. Sweet into partnership.

On September 2, 1824, George Danforth of Norton, was granted a patent on his counter twisting spinning speeder, the throstle frame constituting an important improvement upon the ordinary throstle, which had superseded the water frame. It dispensed with a flyer, and produced yarn less wiry and at a lesser cost for certain kinds of goods, than the common throstle of the period. Patented in England, about 1830, it gave rise to numerous later inventions for improvement of the original throstle.

In 1828 the Center Mills Cotton Factory was started on the Rumford River and it was succeeded by L. M. Wheaton, Nathan Smith and Story & Talbot.

THE TALBOT WOOL COMBING CO.

In 1909, the Talbot Wool Combing Co. was incorporated. This enterprise began in the '60s as the Center Mills, and in 1878 George H. Talbot became the sole owner. Two years later he greatly enlarged the plant, and when it was burned in 1890 he rebuilt, and provided capacity to treat 7,000,000 pounds of wool a year. Wool washing and job work constituted the original production program, but in 1909 the manufacture of wool tops, and carding and combing operations were added. Today, the company's plant covers five acres, is thoroughly up-to-date and upwards of 200 operatives are steadily employed, the concern being owned by Frank S. Talbot.

Other present day industries of Norton include the Defiance Mfg. Company, whose plant is located at Barrowsville, employing 200 in the dyeing, bleaching and finishing of fine cotton piece fabrics and artificial silk goods, with a New York office, at 320 Broadway, John F. Bannon being president, Joseph B. Warne, vice president, and William F. Allen, treasurer and secretary. Here is a concern which was not incorporated until 1915, and which today has capital of $800,000, and capacity to turn out 1,000,000 yards weekly; the Sprague & Reynolds Company, with Eugene R. Ashley as president, G. L. Sprague as treasurer and C. E. Reynolds, as secretary, and capitalized at $119,000, employing at its Norton plant 100 hands in the production of wooden boxes and box shooks, the local unit having been purchased by A. H. Sweet & Son Company, in 1923, which concern was one of Norton's oldest business enterprises, and the successor to Messenger & Sweet, who manufactured matches and wood and paper boxes; Sturdy Brothers, whose plant is at Chartley, employing 100 hands in the manufacture of pearl mounted jewelry, the concern being owned by Arthur T. and Harry P. Sturdy; the Sweet Paper Box Co., capitalized at

$20,000, employing thirty, in the production of paper boxes, Frank L. Nelson being president, George H. Fuller, treasurer, and Louis J. L'Amoureaux, secretary; and the Freeman-Daughaday Company, with capital of $300,000, employing in its Chartley and Providence factories 300 men and women in the manufacture of men's jewelry.

In 1927, Norton had seven manufacturing concerns, capitalized at $1,750,245, using stock and materials valued at $363,733, paying wages to 494 employees amounting to $549,796 and manufacturing products valued at $1,488,412.

RAYNHAM

The town of Raynham is famous for the iron forge established there in 1652 by Henry and James Leonard, a subject that has heretofore been treated in these historical articles.

Today, the town has five small industrial units—the Nelson Rivet Co., engaged in manufacturing rivets, burrs, special wire nails, boxes and shooks, of which concern Arthur E. Nelson is president, F. Nelson treasurer and Samuel Nelson secretary; Edwin Williams, producing box boards, the Specialty Nail Co., employing fifty in the manufacture of wire nails, Walter F. Baker being president and E. G. Sawtell, treasurer; the Raynham Bleachery, Inc., of which George E. Clement is president and treasurer, and John P. Carr, secretary, and engaged in manufacturing wiping cloth; and George E. Williams, engaged in producing box boards and shooks.

REHOBOTH

In 1808 the Rehoboth Union Mfg. Company built a cotton mill, equipped with 360 spindles, in Rehoboth, which was operated by various owners up to 1898, when the plant was demolished.

In 1810 the Palmer's River Mfg. Company erected a cotton mill in the town and although burned in 1831 a new structure was erected and was operated until 1884, when it, too, was destroyed by fire.

Today, Rehoboth's only industries are the Rehoboth Porcelain Enamel Co., employing thirty hands in vitreous enameling, E. L. Baker being president, J. P. Barstow treasurer and H. W. Thomas secretary of the corporation, and the A. L. Vincent Shoe Co., of which A. L. Vincent is president and J. C. Vincent treasurer and secretary.

SEEKONK AND SOMERSET

Seekonk's only industry is the Kent Mfg. Company, engaged in the production of tennis racquets and croquet sets.

In the town of Somerset the Somerset Iron Works Company was organized in 1853 to manufacture ship anchors and two years later the concern was succeeded by the Mount Hope Iron Works Company which continued operations until 1871, when the Parker Mills, of Wareham, bought the plant and in 1881 sold it to the Old Colony Iron Company, ultimately disposing of it to the New England Shellac Works.

In 1854 the Boston Stove Company was organized for the manufacture of stoves and hollow-ware. In 1867, the Somerset Cooperative Stove Company was formed to manufacture ranges.

Today, Somerset has in the Montaup Electric Company an industrial concern in which millions of dollars have been invested since 1923 and which bids fair to mean more to the town than all the enterprises that have preceded it since the town was incorporated.

Capitalized for $8,500,000, the concern employs ninety operatives in providing electric light and power to that section of the state. Charles Walcott is president, Henry B. Sawyer treasurer, and Roy F. Whitney general manager.

The Crowningshield Ship Building Co., with capital of $300,000, employs fifty men in the production of ships, Thomas H. McNerney being president and treasurer and John F. McNerney is vice president and secretary.

The E. S. Parks Shellac Co., of Fall River, operates a branch plant in Somerset.

SWANSEA

In 1806 Oliver Chace and others erected a dam and a cotton factory on Lee's River, in Swansea, which was operated until 1838, when it was burned and never rebuilt.

The Swansea Print Works, incorporated in 1890, today employ 100 hands in printing, dyeing, bleaching and finishing cotton piece goods, and in 1916 an addition 50 by 100 feet, two stories high, was built, which enables the concern to handle six tons of fabrics daily. The site of the plant was the location of a paper mill, in 1840, and later the premises were used as a bakery, and a dance hall.

The company has capital of $150,000 and W. H. Reeves is president, Ralph H. Melcer treasurer and George A. Mathewson secretary of the corporation.

In 1879 Daniel R. Child removed to Barneyville, in Swansea, and erected a small shop which he operated under the name of the D. R. Child Co., and where collar buttons and sleeve links were produced, removing two or three years later to a larger plant. In 1894 Lorenzo P. Sturtevant bought the premises and enlarged the factory, and after several business changes the North Swansea Mfg. Co. was formed in 1911, and sixty hands are now employed.

Rothwell Brothers Foundry is engaged in the production of grey iron castings, Henry Rothwell being president and Edwin Rothwell treasurer and secretary.

WESTPORT

In 1789, William Gifford and Lemuel Mille bought the site where today stands the plant of the Westport Manufacturing Company, in Westport, and there established an iron forge. The oldest unit of the present plant was erected in 1812.

It was in December of that year that John Mason, Joseph Strange and Job White bought seventy acres of land, a sawmill, a mill dam and water privilege, in Westport, for $1,200 and formed the Westport Cotton Manufacturing Co., with $20,000 capital. The business had its inception at a period when the stimulus of a market closed to foreign production was giving an inflated encouragement to domestic enterprise, but the mill was not ready for operation when peace was declared, and a general depression set in. The concern was reorganized in 1814, when 200 additional acres of land were bought, and a wooden mill erected. Again the company changed hands and in 1822 the name of the corporation was changed to Westport Manufacturing Co., under which it operates today.

When the wooden mill burned in 1826, a stone plant was erected. Through various changing managements the concern continued on and in 1870-71 the mill was enlarged to double its size and capacity, while a

year later what is known as the Lower Mill was erected, and subsequently four store houses and other buildings were erected.

Realty holdings increased to 1,400 acres, some seventy houses, two churches and a schoolhouse were built by the concern, as well as a new dam.

The concern is capitalized at $600,000, employs 300 hands and turns out cotton waste products. H. L. Trafford is president, A. W. Lewis vice president and general manager, Charles A. Trafford, Jr., treasurer, and William C. T. Lewis, assistant treasurer, of the corporation.

CHAPTER XVI

LYNN

CITY OF ELECTRICAL APPARATUS AND WOMEN'S SHOES

If the word of critics of industrial Massachusetts is to be relied upon, and if a specific kind of manufacturing originally established in a given community is superseded by some other type of production which ultimately becomes the predominating industry of that locality, is to be regarded as evidence of decay, rather than as an instance of a progressive change in the economic aspect of a city or town, then Lynn has not the slightest excuse for being internationally known as it has been for fifty or more years, as the city in which have been produced more shoes for women than have been manufactured in any other municipality in the entire world.

AMERICA'S FIRST IRON WORKS CO.

For it was within the geographic limitations of Lynn that the first evidence of industrial production in that locality is secured in the form of the Lynn Iron Works, established in 1643—less than a quarter of a century after the landing of the Pilgrims, at Plymouth.

From the humble beginnings of the Lynn, Braintree and Saugus Works has developed the enormous iron trade of the United States—an industry so gigantic that the ups and downs of iron and steel constitute, fully as much as any other factor, the barometer of trade in this country.

In these twentieth century days, when legislative bodies seem to find it desirable to enact statutes designed to hamper business, it is worthy of observation that even the entrepreneurs of Lynn found themselves the victims of public opinion and of rank prejudice, as the early settlers of that vicinity discouraged the smelting of the bog iron ore extracted from the Essex County marshes because they feared the crude forges of the period would consume so much wood that this type of fuel would become scarce and expensive and would soon be exhausted.

They have their counterparts in the people of this day and generation who are sitting up nights worrying themselves almost to death because of their fear that the supply of petroleum will give out before they take their last automobile ride to "that bourne from which no traveler returns."

In the archives of the Business Historical Society, at Cambridge, are some fifty or sixty original letters, inventories, copies of agreements, and other papers, undoubtedly all that remain of the file of an attorney connected with the litigation in which the Lynn Iron Works became involved. Letters and papers of Gov. John Winthrop, and his son, John Winthrop, Jr., and of the General Court and of the quarterly courts of Essex and Suffolk counties yield supplementary information.

Thomas Dexter and Capt. Robert Bridges found a deposit of bog iron in a part of what was then Lynn and is now a part of the town of Saugus. Captain Bridges is reported to have gone to England with specimens of the ore and he was no doubt ably seconded by John Winthrop, Jr. They succeeded in interesting eleven London capitalists to subscribe £1,000,

and Winthrop sailed for New England in the summer of 1643 with skilled workmen and material, but the group did not reach Massachusetts Bay until too late in the fall for any work to be done, and the ironmongers were in idleness all winter.

THE SITE CAN BE SEEN TODAY

The site chosen for the works was on a stream near a water power not far from the ford on the present state highway, leading from Lynn to Boston. To this day there exists a large cinder bank, the result of the operation of these works, and across the road stands one of the houses used by the company. For a long time the site was referred to as Hammersmith, after the place in England from which the skilled workers came.

The records of the General Court show the negotiations for what was the equivalent of a charter. The "undertakers for the iron works in New England," as they were called, were given a monopoly for twenty-one years to erect works in six different places, which, however, must include forges as well as smelters. In any place selected they were to have three miles square "which is 12 miles in compas" of land then unappropriated —all this, provided the works were erected within three years. Certain remissions of taxes and all freedom from "trainings and watchings" were granted to the company and its servants. It was also stipulated that the iron should be sold at not above £20 per ton.

The subsequent story of the works is interesting from the human side, and if shorn of its seventeenth century habiliments carries all of the glamour of a modern industrial enterprise. Evidently, John Winthrop had hoped to be named as the agent of the new works, but the promoters appointed Richard Leader, and Winthrop busied himself by opening a black lead mine, near Southbridge.

THE FIRST CUSTOMER-OWNERSHIP PLAN

Like many a present day undertaking, the company spent more money in setting up the works than had been anticipated and an appeal was made to the General Court for assistance, which was forthcoming. Once again our minds are disabused when we learn that the twentieeth century policy of customer-ownership, which is popularly supposed to be of recent birth, was embodied in the legislative resolution of more than 280 years ago when all persons who "intend their own benefits with the common good" were urged to subscribe to this private enterprise.

The Legislature thus expressed itself:

"Whereas it is now found by sufficient proofe that ye iron worke is very successful (both in ye richnes of ye ore and ye goodness of ye iron) and like to be of great benefit to ye whole country, especially if ye inhabitants here should be interested therein, in some good proportion, (one halfe at the least), and whereas ye time limited for adventurers to come in wilbe expired in the 9th Mo next, this Court taking ye same into a serious consideration and being careful that such an opportunity for so great advantage to ye commonwealth might not be let slip, have taken order that speedy notice thereof should be given to every towne within this iurisdiction, expecting that all persons as are of sufficient ability and intend their owne benefit, with ye common good, will forthwith appeare, to come in to share in ye worke, according to their abilities; and for their better instruction and direction herein they are hereby to understand that there is already disbursed between £1,200 and £1,500 with which ye furnace is built, with that which belongeth to it, and good quality of mine,

coale and wood provided & some tuns of sowe iron cast and some other things in readiness for ye forge etc. They are also to know that no adventurer is to put in lesse than £100 but divers may ioyne together to make up that sume, so it come under one name: there wilbe neede of some £1,500 to finish ye forge etc., which wilbe accepted in mony, beaver, wheate, coales, or any such comodities as will satisfy ye workman, and these are to be paid in to Mr. Henry Webbe, of Boston, by such direction as they may receive from ye undertakers, Mr. John Winthrop, Iuni., Maior Sedgwick, Mr. Henry Webbe aforesaid and Mr. Joshua Hewes. The new adventurers are also to know that they must beare their part in such losse as is befallen ye first stock, by forbearance, or otherwise, to ye time of ye newe adventurers paying in their adventures; & all such as will adventure are desired to hasten their resolutions, that ye worke may go on spedily."

How general the response was cannot be asserted, but it is known that the works were finished and at least from the standpoint of the colonists were successful, for Governor Winthrop wrote on two occasions:

"The iron work goeth on with more hope. It yields near about 7 tons per week, but it is out of that brown earth which lies under the bog mine. They tried another mine and after 24 hours they had a sowe of about 500 which when they brake, they conceived to be a 5th part silver. There is a grave man of good fashion come now over to see how things stand here. He is one who hath been exercised in iron works." And again in the same year, "The furnace run 8 tuns per week and their bar iron is as good as Spanish."

The London promoters becoming dissatisfied with their investment, appealed to the General Court to extend the ten-year time limit originally allowed for the setting up of the works to twenty-one years, the limit of the grant. The request was refused and this explanation offered: "If those 6 workes should take up all our fit places, & when your terme is expired, some of ours should have meanes to erect any such worke, wee should have ye bennefitt thereof etc."

In 1657, when there was a temporary shut-down and the company owed much money in the Colony, the General Court granted to petitioners in Concord and Lancaster the right to erect iron works, stating that the Lynn works were not likely long to continue; that they had not supplied the colonists with iron as need because they did not have it on hand, and that they had charged about £20 per ton. The Legislature, however, protected the old Company, in that they gave it the right to buy out the new works within the year and prohibited any solicitation of workers from Lynn.

The works were supplying castings, wrought iron, and steel to the colonists in small lots as needed, pay being taken in the only media available, namely, beaver, wheat, and anything else of local use, including wampum. Little of this except beaver could be shipped to England, and with the fluctuations in value it is doubtful if the works developed a profit.

PRIMITIVE METHODS EMPLOYED IN SECURING THE BOG ORE

The precise location of the Lynn "Bog Myne" is not established, except that some of the ore was dug up on land belonging to Adam Hawkes, whose descendants still live on a part of his property. Supplementary raw material came from the ledge in Nahant, and was mined by building a hot fire on the ore and then pouring water on the heated rock. Local tradition attributes the lime supply to shell heaps of which there are remains in the neighborhood, and at many other places along the coast.

There is also a record of two tons of limestone imported from England—this material not being discovered in the colony until 1697. The charcoal came from trees then growing on the 3,000-acre grant and many references are found to cutting wood and hauling "coales."

The first pot cast from the Lynn product is preserved in the Public Library in that city, having been handed down in the family to whom it was given in part payment for some land bought by the company. In addition to a furnace and a forge, a splitting mill was set up for cutting bar iron into rods, out of which nails were forged. A small plant was also erected at Braintree.

An inventory made about 1654 shows one lot of thirty-six anchors weighing about sixty pounds apiece—cast pans in addition to pots, forgings of all kinds, tools, such as "4 croscutt sawes not fitted," and nails and spikes. The product went into the surrounding country. There is a record of a shipment to Piscataqua, now Portsmouth, N. H., where the first agent, Richard Leader, established himself. There is another referring to a ship sent with pots and other goods on a trading voyage to the "Dutch and Delaware" in 1651-2, and one also to the Barbadoes, and there is the testimony of William Osburne that in the latter part of 1652, or early in 1653, a ship load of iron was sent to John Beck in London.

Absentee ownership, the uncertainty of communication, money stringency, divided managerial authority and obsolescence of equipment all conspired to court litigation and the passing of the works into the hands of many creditors.

THE WORKS PRODUCED MANY IRON MASTERS

Later, the works resumed operations, but under more difficult conditions, for the promoters were forced to go as far as Reading for their ore. The enterprise was controlled finally by William Paine, the inventory of whose property, after his death in 1660, contained the item: "three-fourths of the works at Hammersmith and Braintree for £800." His son mortgaged them to the Appletons to fulfill the terms of his father's will, and about 1688 they ceased to exist.

Workmen trained at the Lynn works went to other places in the colonies as new plants were started. Here Joseph Jenckes, who also had a wire mill, invented the modern form of scythe. It was here the skill to cut the first die for the "Pine Tree" shilling was developed. Jenckes was often referred to as the Tubal Cain of the colonies, and was given a legislative patent to make for a period of fourteen years scythes and edged tools, and engines for mills operating by water power. As an artificer he possessed extraordinary ingenuity and undoubtedly was the first Colonial mechanic to work in brass and iron on the American continent. His genius assumed a wide range for, in October, 1652, when Massachusetts undertook to supply the deficiency of specie by a silver coinage, he was employed to prepare the dies, which he stamped with the name of the Colony and a pine tree in the center "as an apt symbol of its progressive vigor." Two years later he contracted with the Selectmen of Boston to build an engine to carry water in case of fire—undoubtedly the first attempt to make or use a fire-engine in America.

Here also worked Henry and James Leonard, of whose descendants it was said, "Where you can find iron works, there you will find a Leonard."

Despite the fact that iron works flourished throughout Plymouth, Bristol, Norfolk, Essex and Worcester counties up to the Revolution, it was long before that period that the fires in the Lynn forges flickered

and expired, never to be rekindled, while the begrimed artisans departed from the scenes of their triumphs, and today the only tangible evidence of the existence of the iron establishment are two or three grass covered hillocks of scorae. Curious visitors sometimes dig through the thin covering of soil and into the slag only to unearth an occasional bit of charcoal apparently as fresh as when originally ejected from the sooty portals of the forge, while now and then an ancient piece of iron casting is brought to light.

THE COMING OF THE LEATHER MANUFACTURERS

Just at the dawn of the eighteenth century the manufacture of morocco leather was begun in Lynn by William Rose, an Englishman, who had been reared in the business in London. It was successively promoted by Joshua R. Gore, Francis Moore, Henry Healy, William B. and Joshua Whitney, Messrs, Carter & Tarbell, Samuel Mulliken, Daniel R. Witt and Joseph Mansfield.

The manufacture of leather and shoes had already become an important branch of New England industry. As early as 1731, the Lords of Trade, as the result of inquiries instituted through the colonial governors, reported to Parliament that the greater part of the leather used in Massachusetts was manufactured in the Province.

A very considerable improvement was made, some twenty years later, in the shoe manufacture in Massachusetts, which had given an impulse to the business in the province, and particularly in Essex County, which then, as now, probably made as much leather and as many shoes as all the rest of the state. But Lynn carried on the manufacture of women's shoes as a principal industry for about a hundred years, before any essential improvement was made. The art of the shoemaker was indeed very imperfectly understood. Workmen were generally unskilled, as those who possessed the knowledge and capital to insure success preferred an investment in land or trade. The business was consequently but limited. At the end of a century, during which a surplus for exportation had been produced at Lynn, only three manufacturers employed journeymen. The business was chiefly conducted in families by the manufacturers, assisted by his sons and apprentices. New England was the principal market, and a few pairs of shoes were sent to New York and Philadelphia, and occasionally, perhaps, to other ports.

From that time, and especially after the Revolution, the business increased rapidly, and attracted to it a larger amount of capital. With other manufactures, that of shoes received a severe check through the large importations made just before the war, and again soon after peace had been declared. Considerable quantities of shoes for the use of the army were drawn by Congress from Massachusetts during the Revolution. The business was revived and greatly extended before the close of the eighteenth century. It was estimated in 1788 that Lynn exported yearly of women's shoes one hundred thousand pairs. A computation made in 1795 fixed the number of master-workmen in Lynn to be 200, and the journeymen and apprentices 600. About 300,000 pairs were then exported by the manufacturers chiefly to southern markets. They were sent from Boston, New York, and Philadelphia, to England, and some direct from Lynn to Europe. A single manufacturer was said to have shipped from his own workshop, within seven months, 20,000 pairs of shoes, valued at 4,947 pounds, exclusive of many sold in the neighborhood.

The fisheries of New England furnished an abundance of oil at a cheap rate for the leather-manufacturer. From the coasts of Labrador and Newfoundland were also obtained, before the Revolution, considerable quantities of seal skins. On account of the high duty upon them in England, many, which would otherwise have gone there, were sent to New England, where they were tanned and made into boots, and shoes, and returned to supply the fishermen on the northeast coast. Others were dressed in the hair, and were variously employed in making trunks, caps, coats, etc. The manufacture of leather in Massachusetts in early times was chiefly confined to the old maritime counties, Essex, Middlesex and Suffolk.

THE BEGINNING OF OUR PATENT SYSTEM

In the system of laws called the "Body of Liberties," adopted by the General Court of Massachusetts in 1641, was a provision declaring that there "should be no monopolies but of such new inventions as were profitable to the country, and that for a short time only." This was really the beginning of the patent system in the United States—a policy which had its rise in England in the seventeenth century.

One of the first applicants for exclusive privileges under this initial New England code was Joseph Jenckes, of Lynn, who came to the Province in 1645. In the following year, he presented a petition for a patent providing for a new application of water-power for various uses in mills, including sawmills. On May 6, 1646, the Court resolved that: "In answer to the peticon of Joseph Jenckes, for liberty to make experience of his abilityes and Inventions for ye making of ENGINES for mills to goe with water for ye more speedy dispatch of worke then formerly, and mills for ye making of SITHES and other Edged tooles, with a new Invented SAWE-MILL, that things may be afforded cheaper then formerly, and that for fowerteen yeeres without disturbance by any others setting up the like inventions, that so his study and cost may not be in vayne or lost; this peticon is granted so as power is still left to restrain ye exportation of such manufactures, and to moderate ye prizes thereof, if occasion so require."

Between 300 and 400 patents for inventions and improvements were granted under this act during the seventeenth century.

In 1629 Francis Ingalls settled in what was then Lynn, close to Humphrey's Brook, and established the first tannery in the United States. Here he planted the seed from which Lynn grew to be one of the greatest shoe centers in the United States. The tannery was located close to a large oak forest, and with an abundance of water from the brook, and plenty of skins to be purchased from the Indians for beads, wampum, guns and "fire water," it soon became a flourishing industry.

JOHN ADAM DAGYR, THE CELEBRATED SHOEMAKER

While Edmund Bridges and Philip Kirtland, who flourished as early as 1635, are thought to have been the first shoemakers of Lynn, it was not until considerably more than a century later that John Adam Dagyr, a Welshman, who settled in the Essex County town, in 1750, succeeded in raising the hitherto humble operation of shoemaking to a fine art when he dissected shoes imported from Europe and discovered the hidden mystery of their elegance. By 1764 he was known far and wide throughout the colonies as "the celebrated shoe-maker of Lynn."

Not until 1810 do we obtain an accurate statistical picture of what had been accomplished between Dagyr's era and the first decade of the

nineteenth century, but in that year Lynn shoemakers produced 1,000,000 pairs of shoes, said to have had a value of $800,000.

Twenty years later, Lynn turned out 1,670,000 pairs a year, and by 1855 she had stepped up her production more than five fold, the figures of that year being reported as numbering 9,275,593 pairs.

In 1860 the total value of all manufactures in Lynn was $5,736,043, all of which, save about $1,000,000 was credited to shoe production. There were 136 boot and shoe concerns, capitalized in the aggregate at $1,039,-100, employing 5,767 males, and 2,862 females, and producing about 6,000,000 pairs of shoes, valued at $4,867,375. In addition there were nineteen morocco plants, six last factories, three manufacturers of shoe tools, four of boxes and one leather-cutting machinery concern, making a total of 169 establishments directly or indirectly identified with the shoe trade. Minor manufactures of the period included glue, beer, iron, lightning rod, tin, sheet-iron, cigar, soap and stove polish units.

Philip R. Tapley, of Lynn, was the first man in Massachusetts and probably in the country to introduce steam in a tannery, employing it as early as 1860.

Between 1865 and 1875 Lynn manufactured 10,000,000 pairs of shoes a year of an average value of $1.20.

There are those who take delight in baldly asserting, without facts or figures to back up their statements, that Lynn has been on the down grade in shoe production, but fortunately there are available the statistics of approximately fifty years ago which can be compared with those of today.

Notwithstanding the vicissitudes of shoe and leather production in recent years, Lynn has made one of the most remarkable and outstanding recoveries recorded anywhere in the East, and although this industry long since passed its premiership in the city to the electrical machinery and apparatus type of production, the value of shoes produced, and cut stock, findings and leather manufactured, as well as the total number of wage earners in these ramifications of the footwear industries, was higher in 1928 than for any year since 1923. Taking the industries of the city as a whole, this is true to even a greater extent, as the total value of all her manufactures in 1926 was the largest for any year in the last half decade, exceeding that of 1925 by more than nineteen and a half million dollars. For all her industries the gain in product value, as compared with 1925, amounted to 20.1 per cent and the average number of wage earners in Lynn's industries—21,951—shows an increase of 15.9 per cent over 1925, thus giving the municipality seventh rank among the cities in industrial importance in Massachusetts, measured by value of product in 1926.

From the close of the World War to about two years ago the industry, so far as Lynn is concerned, began to slip, and in alarming proportions. In the year 1919, with 105 factories in operation, the city produced shoes to the value of $66,457,349. The same number of plants in the next year showed a drop in output, as measured by values, to $56,478,484. By 1922 the number of plants had grown to 125, but the output was less than half the 1919 value, at $31,671,819. The following two years witnessed the crisis in Lynn's shoe situation. Labor troubles were declared responsible for more than twenty-five manufacturers either leaving the city or liquidating business, with the result that in 1924 production was valued at only $27,010,842.

Effect of the concerns which left the city cannot be taken too lightly. Those establishments, running normally, were equipped to produce about

154,800 pairs per week or 6,192,000 pairs a year. At conservative labor costs of 90 cents per pair, this means a loss in payroll of $5,572,800 per year. At $2.50 per pair, the loss in production value figures at roughly $15,480,000 a year. Measured in terms of employment, this migration and liquidation threw 2,150 out of employment.

What is the picture today? Again there are more than 100 plants making shoes at Lynn; twenty-five new shoe manufacturers have been added to the list in the past two years. This has added $2,000,000 annually to the payroll of the industry at Lynn.

In 1928, Lynn did a bigger business in the manufacture of shoes, and in the allied lines of boot and shoe cut stock and findings, and in leather production, than in 1927. The city shared in the general gain of New England shoemaking, which showed an increase of 8 per cent in 1928, over 1927, a percentage better than the average gain for the country. The footwear and allied lines showed a total of more than $50,000,000 in 1928, a local business of about $1,000,000 a week, a figure greater than was dreamed of before the war.

Lynn's largest gain is in sales to chain stores but its sales in the South, and to Texas and California, are showing large and steady increases.

An interesting feature is that Lynn in recent years has changed its production from medium and lower grades of women's shoes to the higher grades almost entirely. Primarily Lynn is a women's shoe center, and milady today wants as much style in her shoes as in her gowns or hats. This she is getting from Lynn, where there is something new in shoe styles every day. Production for the most part is in millinery or novelty shoes. Because of the character of the output, fast production is required. A new style of Lynn shoes produced this morning is shipped late in the afternoon for sale in New York stores the following morning. Such rapidly changing whims of the feminine buyer must be catered to while the demand is active.

Although a shoe city, Lynn has no large factories such as are found in Brockton.

A CONCERN WHOSE NAME IS A HOUSEHOLD WORD

Since the Centennial Year of American independence Lynn has been famous as the home of the Lydia E. Pinkham Medicine Company, whose products probably are as well advertised as any in the universe. In the panic year of 1873, Isaac Pinkham, the husband of Lydia E. Pinkham, who for thirty years had dealt in real estate, found his money gone, his credit impaired, such realty holdings as remained a drug on the market, and, being unable to settle with his creditors, he not only became insolvent, but a physical wreck as well. It was then that Mrs. Pinkham called her four sons and a daughter about her, faced the crisis with characteristic firmness and courage, and decided to make use of a formula for a botanic remedy for disease of women, which had been in her family many years.

At the outset, the preparation of the medicine was carried on by Mrs. Pinkham in her own kitchen, over the hot range. She appreciated the necessity of advertising the product, but there was little money for that. A few circulars were printed, and distributed from door to door by her young sons. Next a small announcement was placed in a Boston newspaper, and when an order was received, from a leading druggist, for $18 worth of medicine the family celebrated by staging a special holiday.

For seven long years Mrs. Pinkham waged a hard and strenuous

battle, and then the tide turned, but her death, in 1883, at the age of sixty-four, came at just about the time that the business attained an international reputation. Today the company, which was incorporated in 1883, the year of the death of the founder, has a surplus of over $2,000,000, and employs upwards of 100 hands. Arthur W. Pinkham is president, Charles H. Pinkham secretary and A. P. Gove treasurer and general manager.

A FASCINATING EPIC OF AMERICAN BUSINESS

How singular it is that what at the moment appears to be a more or less trivial event in the life of a person or a town or city may ultimately become, in the march of years, the predominant influence in the growth or failure of a human being or of a municipality.

As one surveys Lynn's past it is apparent that had it not been for the vision and foresight of some of her progressive citizens, who formed the local electric light company in the early '80s, and who recognized that the development of the electrical art was then but in its infancy, the Essex County city would today be considered merely as a shoe center, rather than as the seat of the corporation utilizing the largest number of workers of any industrial concern in Massachusetts, and in all its plants, an army of 75,000 employees.

Becoming convinced that they could profitably invest capital for the manufacture and introduction of electrical apparatus into the marts of trade, a group of Lynn boosters approached the officials of the American Electric Company, whose plant and operations were then located in New Britain, Conn., and induced them to remove the machinery to a substantial brick factory building, situated on Western Avenue, Lynn, which had been erected by the late Minot Tirrell, who had spent nearly the whole of a large fortune he had inherited in improving manufacturing and commercial conditions in Lynn, and in providing facilities which were of lasting and inestimable benefit to the city.

THE INFLUENCE OF THE ADVENT OF THE COMPANY ON THE GROWTH OF LYNN

When fate conspired to designate the city of Lynn as the habitat of this new handmaiden of mankind—electricity—and when New Britain permitted Prof. Elihu Thomson to transfer his research and inventive capacities from the Nutmeg State to the salty marshes of Essex County, it was ordained that in less than fifty years Lynn would become a city of more than 100,000 people, while New Britain would content itself with about 70,000, at the same period.

Many families were brought to Lynn from the Connecticut city coincident with the removal of the plant, and as early as 1887, 600 hands were employed, and the annual products of the concern were then valued at $1,000,000.

The electrical inventions of Elihu Thomson, revolutionary as they then seemed, speedily attracted the attention of Boston capitalists whose money was poured into the coffers of the corporations which were created to provide New England and the West with this modern servant of humankind—electricity.

The inception of the American Electric Co. occurred in Philadelphia, early in 1879, when Prof. Elihu Thomson was teaching chemistry and mechanics in the Central High School there, and when Prof. Edwin J. Houston had charge of the Department of Physics, in the same educational institution. Each lectured in the winter courses at the Franklin Institute, in that city, and in one of a course of five lectures on electricity,

in 1877, Professor Thomson employed a small dynamo of his own construction, which was capable of operating a small arc light.

The Institute proposed to buy a dynamo for its own use, and a committee was appointed to investigate and make tests of such machines as might then be found on the market. The work of this committee, the electrical part of which fell to Professors Thomson and Houston, spread over several months, and was published as a report in the *Journal* of the Institute, in 1878, and as Professor Thomson today says "it was this work which drew my own attention very strongly to the possible future applications of dynamo machines. The measurements we made were practically the first comprehensive set concerning such machines and their capacity."

Professor Thomson visited the Paris Exposition, in 1878, and observed the progress that had been made in Europe in electric lighting, and became more than ever convinced that the field offered great chances for development and expansion.

PROFESSOR THOMSON BUILDS A LARGER DYNAMO

Upon his return, he built a dynamo of much larger capacity than any he had previously made, and operated it at the Institute. This old machine, still in existence in Lynn, was not only a direct current dynamo, producing by change of connections several voltages and currents, but also was a self-exciting alternator, yielding two-phase currents, a construction truly novel at the time, and one that attracted the attention of Thomas H. McCollin, a friend of Professor Thomson, and then engaged in the photographic supply business in Philadelphia. With his brother-in-law, George S. Garrett, of Garretsford, Pa., who had also been attracted by the possibilities of commercial electric lighting, McCollin proposed to build dynamos and electric arc lamps on a commercial basis, provided Professor Thomson would assure them that it could be done successfully. After carefully considering the subject, Professor Thomson concluded that it would be feasible to construct the required apparatus on new lines, and that patents could be applied for covering the ideas involved.

Garrett offered to provide funds to build the first machine, which Professor Thomson constructed in the early spring of 1879 and which was placed in operation the latter part of March. It was the first dynamo of the three-phase type, i. e., of the well known Thomson-Houston Three Coil construction, and although no model or miniature embodiment of the ideas had been made, it was capable of successfully maintaining a circuit of nine arc lights in series. It was operated for a period in lighting throughout the night a Philadelphia bakery, and its commercial use was undertaken nearly a year before Thomas A. Edison had produced, even in the experimental stage, the carbon filament electric lamp.

Garrett becoming satisfied that the dynamo could be used commercially, immediately established a small shop in which the machines could be built and tested. A number were constructed and some were placed in actual commercial lighting service in 1879. This was the inception of the Thomson-Houston system of electric arc lighting, and Professor Thomson generously gives credit to Messrs. Garrett and McCollin for the starting of the business.

THE AMERICAN ELECTRIC CO. FORMED

In less than a year Garrett sold the commercial rights of the industry for the territory outside of New Jersey, Pennsylvania, Delaware and

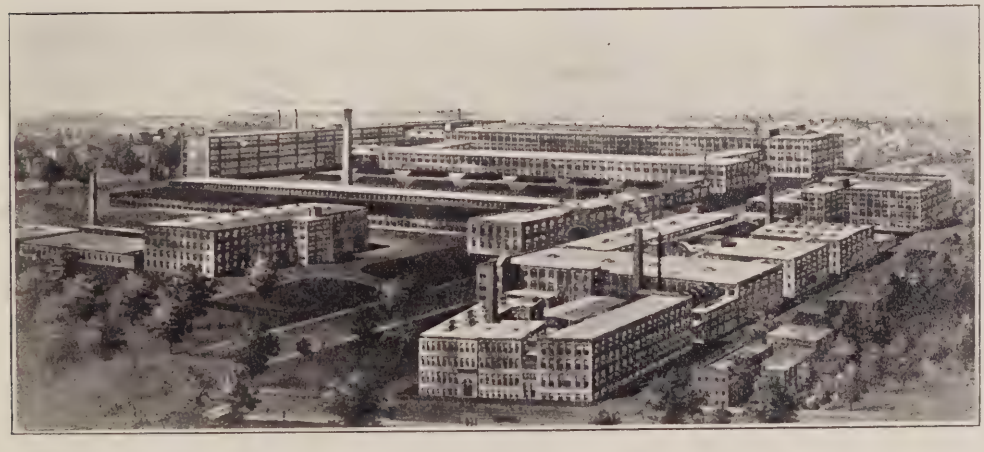


DR. ELIHU THOMSON

Co-founder of the original Thomson-Houston Electric Manufacturing Company, which was merged in the General Electric Company



WHERE THE GENERAL ELECTRIC COMPANY WAS BORN, NOW STANDING AT THE WEST LYNN WORKS AND STILL USED BY THE COMPANY



WEST LYNN WORKS OF THE GENERAL ELECTRIC COMPANY

Maryland, which areas he expected to develop personally, and the American Electric Company was formed to take over the inventions and introduce them commercially into the rest of the United States. The factory was set up at New Britain, Conn., most of the stockholders being Connecticut men, and many of them residents of New Britain.

In the late summer of 1880, Professor Thomson removed from Philadelphia to New Britain, and assumed charge of the development, electrically and otherwise, of the newly formed concern, E. Wilbur Rice, Jr., now Honorary Chairman of the Board of Directors of the General Electric Company, then a young man, nineteen years of age, accompanying him to Connecticut.

The policy adopted by the American Electric Co. was not broad, and the business languished, and finally the majority interest was sold to President Stockly, President of the Brush Electric Co.

Following a small exhibit, staged in Boston, of the arc lights produced by the American Electric Co., S. A. Barton, H. A. Pevear and a third Lynn man, whose name Professor Thomson does not recall, representing the group interested in introducing the new method of illumination in Lynn, went to New Britain to ascertain whether the company could supply the city with the required dynamos and machinery. There they conferred with young Mr. Rice, who interested them in the history of the enterprise, but they found its business affairs in anything but an active state.

In assigning the patents to the American Electric Co., a reservation had been included in the agreement that if the business was not pursued with due diligence or was discontinued, the patents would revert to the patentees upon demand, and would be accompanied by a tender of the stock given to the patentees at the time the company was organized. The tender was made and the return of the patents demanded, but the clause was unknown to President Stockly, until his attention was directed to it by Professor Thomson. When Messrs. Barton and Pevear, and the group of Lynn men later made overtures to Stockly to purchase the majority stock interest held by Professors Thomson and Houston, he was willing to sell his holdings. The Lynn syndicate was principally made up of shoe and leather manufacturers who had subscribed an amount sufficient to acquire the interest bought by Stockly, for the Brush Electric Co., after having been assured that Professors Thomson and Houston would join with them in developing the business, at Lynn.

Charles A. Coffin, who later became President of the General Electric Co., was one of the principal and most active members of the Lynn syndicate, and of the others in the group many retained their stock interest in the Thomson-Houston Company, and its corporate successor, The General Electric Company.

THE THOMSON-HOUSTON CO. ORGANIZED

For a short period, until the new Lynn factory was ready for occupancy, the business was carried on at New Britain, but the old American Electric Co. was liquidated, and the new corporation took the name of Thomson-Houston Electric Company.

Upon first being occupied, in November, 1883, the Lynn plant was leased, and later acquired by the company, today being known as Factory A of the West Lynn Works, of The General Electric Company. The fact that this structure is still standing, and is still being used daily, makes it the oldest General Electric building in the world. The original business of arc lighting was extended to include other forms of illumination,

and later a sizable department was created to manufacture motors and equipment for electric street railways.

Mr. Rice became superintendent of the factory and a general expansion in electrical fields enabled the new company to succeed in its commercial work, as there had been active development in the invention and designing of electrical machinery.

In the fall of 1883, Mr. Coffin, formerly engaged in shoe manufacturing, assumed charge of the general management of the company, and it was in large measure to his efforts that the marked success of the enterprise was due. He offered every encouragement to the development of inventions or novel ideas and this policy resulted in the patenting of numerous inventions of very vital importance to the future of the art. He was imbued with the value of combining in his organization the best products, as was exemplified by his purchase of the Van Depoele concern, whose electric railway appliances were outstanding, and upon which the electric railway business of the Thomson-Houston Electric Co. was founded.

In 1884 the Thomson-Houston International General Electric Company was formed to act as agent of the parent corporation in foreign countries. It limited its activities at the outset to the introduction of the Thomson-Houston arc lighting system, and the first public appearance of this apparatus overseas was made at the Inventions Exposition, in London, in 1885, where it attracted wide-spread attention.

Laing, Wharton & Down were the company's agents, in Great Britain, and from their early exploitations there grew the British Thomson-Houston Company. Agencies were soon established in Paris, Berlin, and other important European cities, these giving rise to the Societe pour L'Exploitation de la Procedes Thomson-Houston, in France, and the Union Electricitats Gesellschaft, in Berlin, a few years later. The permanence of Charles A. Coffin's work in the foreign field is attested by the fact that the General Electric affiliated company in France still bears the original corporate designation, including the names of Thomson and Houston, although almost forty years have elapsed since the old Thomson-Houston Electric Co. was erased from American electrical nomenclature.

THE DEBT OF THE WORLD TO A NEW ENGLANDER

To Mr. Coffin, more than to any other man, is due the formation, growth, accomplishments and contribution to human well being, of the original Thomson-Houston Co., and its corporate successor, The General Electric Company. This typical New Englander, born in the State of Maine, but removing to Lynn in his early life, where he at once became prominently identified with its industrial enterprises, as a shoe manufacturer, guided the electrical business through its most critical formative years and into ever broadening paths of usefulness, with a constantly increasing unity of purpose, until he attained, long before he retired from the presidency of The General Electric Co., a generally recognized leadership in the electrical industry.

His was an unusual task. The electrical world had no background when he and the Lynn group formed the Thomson-Houston Co. The blazing of a path over virgin ground is a task that may well cause apprehension in the breast of any industrialist, but Mr. Coffin so directed the affairs of the two corporate units with which he was prominently identified as to provide a constructive, vital force in the application of the elec-

trical art to the complex daily needs of an ever widening field, which ultimately embraced the world.

He had the happy faculty of gathering about him in the realms of scientific research, engineering development, and manufacture, such men as Elihu Thomson, E. Wilbur Rice, Jr., and Dr. W. D. Coolidge, (the latter a native of Massachusetts), all of whose technical accomplishments, and inspiring leadership were drawn upon to the full. The real measure of the company's growth, under President Coffin's third of a century regime, is its prestige in matters scientific and mechanical. Under his management, he witnessed the value of the company's manufacturing plants grow from approximately $4,000,000 to $167,000,000, and the number of square feet of factory floor space increase from 400,000 to more than 25,000,000, while its corps of employees rose from 4,000 to upwards of 75,000, scattered in plants located in 40 cities, and with sales offices or distributing agencies in 87 cities. His foreign sales activities were responsible for the shipment of $300,000,000 of the company's products to all parts of the civilized world, outside of the United States.

SOME MAJOR ACCOMPLISHMENTS OF THIRTY YEARS

At the outset, Mr. Coffin directed the thoughts of his scientific associates to the sources of power as the foundation on which to build a greater industry in the service of man and he witnessed in the thirty years following the dotting of every city and large town in the United States with light and power-producing plants—the offspring of Thomas A. Edison's original thought. He saw the important contribution after much research and experimental effort, which followed the first large scale application of the principle embodied in the Curtis steam turbine, whereby a revolving power wheel was driven directly instead of by reciprocating action. He witnessed the extension of electric power on the sea, when, in 1908, the first electric motor for ship propulsion was installed by his company, and later the electric drive on our battleships. He was not only a pioneer in the application of electricity to street railway transportation, but, under his direction, the company first supplied apparatus for the electrification of elevated and later steam railroads on and under the ground.

He was a factor in establishing on American soil and under American auspices a system of world-wide wireless through the medium of the Radio Corporation of America. He saw the progress in illumination from the old carbon lamp to the Mazda-product, due to the improvements of Drs. Whitney and Langmuir, and the triumphs of Dr. Coolidge, the first scientist to succeed in drawing tungsten into wire, rendering it ductile, pliable and stronger than steel. He witnessed the artificial lightning produced by Dr. Charles P. Steinmetz, who for many years dedicated his profound knowledge to the company and who was a vital aid in the solution of many problems that came to Mr. Coffin's desk.

With all the improvements in electrical art and the introduction of better methods of manufacture, and notwithstanding the increased cost of labor and material, the most significant part of Mr. Coffin's regime, which ended in 1922, is that the average selling price of the General Electric products, did not increase as rapidly as the average selling prices of American commodities in general, as shown by reports published by the United States Bureau of Labor Statistics. In 1920, according to the Labor Bureau's Index, prices reached their peak of 231, taking the 1914 average as 100, while the same year the General Electric products reached their peak in prices, but stood at only 155. The average for 1922 of the United

States Labor Bureau's commodity figure was 152, while that of the General Electric Company's products was 125. Taking the price index for incandescent lamps turned out by the company, with the 1914 figure as 100, the General Electric Company's price has not since been over four per cent higher, and in 1922, when Mr. Coffin retired from the presidency, was but 95% of the pre-war price, a fact of profound importance in view of the wonderful improvement in lamp efficiency.

EFFECT OF THE TRANSITION FROM HAND TO MACHINE OPERATION

Probably in few fields of production, no more remarkable demonstration of the departure from the limited operations of hand workers to the almost unlimited program of mechanical or mass production, has been observed than in connection with what has transpired at the Everett Lamp Works, as well as at all other General Electric plants where these commodities are fabricated.



EVERETT WORKS, GENERAL ELECTRIC COMPANY, FROM SOUTHEAST

In 1920, like many other American manufacturers, the General Electric officials were faced with many problems concerning the cost of its products, and it seemed extremely advisable to undertake a series of developments designed to increase the output per operator in order to obtain a more efficient utilization of the company's labor forces. At that period, the concern depended largely upon skilled operators for the manufacture of lamps. The machine development program that has been evolved during the past decade has had for its primary aim the re-designing of the company's equipment so as to render skilled manual labor unnecessary in the production of lamps and to perform automatically, in a better and more reliable and uniform fashion, the operations that formerly depended upon manual dexterity.

Through these developments the floor space required for manufacturing purposes has been more than cut in half and the number of employees has also been substantially reduced. This reduction in the number of direct operators required for the manufacture of the product has had a most beneficial effect in reducing the overhead cost of manufacturing, with the result that there have been many price reductions offered to the public on the company's lamps since 1920, so that present prices for sizes of lamps most generally used are less than half the prices charged for these lamps in 1914. In addition to the decrease in the price of the product, the efficiency of the present-day lamp as a converter of energy into light has been vastly improved during the same period.

The General Electric Company maintains extensive activities devoted to the search for better quality of incandescent lamps and cheaper ways to make them. From time to time new fundamental raw materials are discovered which greatly increase the efficiency with which electrical energy is transformed into light, and, in addition, there has been a continuous development of processes and mechanical methods for manufacturing lamps which have created a greater uniformity of product appearance and performance than was available through the manual operations formerly employed. The result has been a substantial decrease in the cost of light to the users of incandescent lamps. One of the largest factors in the cost of light is the amount of electrical energy used during the life of the lamps and, while it is helpful to reduce to a minimum the cost of manufacturing the lamp itself, it is even more essential to make a product which will attain the maximum light output per unit of electrical energy consumed.

As increased machine capacity was attained, it became evident that too great a diversity of types of product was an obstacle to the attainment of further economies. Both quality improvement and the attainment of a high degree of economy in the cost of manufacture and distribution were exemplified by the introduction of a new standard line of lamps in 25, 40, 50, 60 and 100-watts, with a diffusing frosted coating applied on the inside of the bulb, which was placed on the market in March, 1926. Having for its object the simplification of the product by making available a few sizes of lamps of uniform appearance and construction, and capable of such universal use as to render unnecessary the diversity of bulb shapes and finishes of the forty-five types heretofore used, the results of the first year of experience with the new line were very gratifying. Formerly, in the 15 to 100-watt sizes ordinarily used for home and general lighting purposes but 66% of the lamps were supplied in the bulb shape and finish most popularly used for each wattage size. One year after the introduction of the new line, the quantities of lamps supplied in the new standard bulb increased to 85% of the total: after the second year the percentage of standard line lamps to the total lamps supplied increased to 90%; and it is felt that, as time passes, the degree of simplification may be carried still further through public appreciation of its advantages.

The extent to which users of the company's lamps have benefited through the development of more economical manufacturing methods may be visualized by the fact that, if the quantities of lamps sold by the General Electric Company in 1928 had been supplied at the 1921 prices, the total price paid for them would have been more than $40,000,000 greater than it actually was in 1928.

And yet there are prattling demagogues in and out of political realms who become apoplectic when one dares mention, above a whisper, the benefits that constantly come to the consuming public from large corporations whose economies in production and improved commodities spell financial gain to the purchaser of their manufactures.

Early in his regime as the head of The Thomson-Houston Co., Mr. Coffin invaded new fields, introducing incandescent lamps for series, series parallel and straight multiple arc operations, as early as 1885, 1886, and 1887. The alternating system, with transformer distribution began to occupy attention from its start in 1885 and 1886, while in 1887 there began the enormous expansion in street railway operations. The Van Depoele and Bentley-Knight railway patents constituted the basis of the company's

success in the latter field, and enabled it to take the lead, due to Mr. Coffin's policy of centralizing the production of electrical apparatus.

THE COMING OF THOMAS A. EDISON

Soon after learning telegraphy, Thomas A. Edison became interested in ways of improving the telegraph system, then in common use. It was in Boston, in 1868, that he began his experiments with duplex telegraphy, and there that he took out his first patent—an electrical volt recorder.

In 1869 the firm of Pope, Edison & Co., of New York, who advertised themselves as "Electrical Engineers," burst upon the horizon, but the members of it were primarily interested in telegraphic problems and inventions.

About 1877 the paths of these two men began to diverge into separate channels of electrical development, and Edison organized the Edison Electric Light & Power Co. His keen mind saw far beyond the telegraph and the telephone and he became intensely interested in other possibilities of this wonderful form of energy, then on the threshold of revolutionizing the entire industrial world, and he visioned a great future for electricity in the fields of artificial light and in the extension of electric power. But it was not until October, 1879, when he produced the incandescent lamp after the leading scientists of the world had declared it impossible, that the industry received its first great impulse.

The new lamp entered a world all unprepared for its advent, with only the most primitive of generators to supply it with the life-giving current. Lacking cables or insulated wires for distribution; without any of the devices necessary to using it in the home, office or factory, and without even a socket in which to place it, the incandescent lamp was a commercial foundling and orphan.

But soon cables, insulators, insulated wire, switches, sockets, fuses, better generators and central stations were emptied from Edison's laboratory, and following a public demonstration of the new lamp at Menlo Park, December 31, 1879, steps were taken to exploit the Edison system commercially. The first Edison central station for the sale of electricity to individuals was opened in September, 1882, in New York City. The Edison Machine Works, which had come into being in the same city, in 1881, was reorganized under the title of the Edison General Electric Company, in 1890, to consolidate the expanding interests.

Thus there existed, in the early eighties, two distinct systems of electric lighting. The first, and the oldest, was the arc light plan as developed by Professors Thomson and Houston, by Charles F. Brush, and by others, consisting of a generating station and a transmission system, with powerful arc lights located at intervals along the thoroughfares, but restricted mainly to the illumination of large areas. The second—the Edison system of incandescent lighting was almost the antithesis of the other, central power station current being distributed to hundreds of users, who desired only a few small candle-power lamps, or whose needs required electrical energy for power in small industries.

Obviously both systems had their limitations. Although the alternating-current generator was evolved, in 1885, with the transformer close upon its heels, no motors were available for alternating current circuits, and Edison's direct-current system for both lamps and motors was restricted to a very limited territory because of the difficulties involved in transmitting low-voltage direct current energy.

However, the inventive ingenuity and the commercial acumen of both

branches of the then new industry were such that despite the handicaps, both were successful.

THE GENERAL ELECTRIC CO. BORN IN BOSTON

It was but natural that the promoters of the two should vision the advantages that would flow from a union—a desire to avoid tedious and expensive patent litigation owing to conflicting patent interests, and also to render the public the very best service that could be produced, an object which could only be accomplished by combining the very best inventions of both organizations.

And so, in 1892, the wedding took place.

The world scarcely stops to note what it owes to Boston and to Massachusetts in the great development of electric lighting companies, but in the Hub was born the great General Electric system.

It was Boston men who laid the lines for its future arc light and power developments, which today constitute such a gigantic force in our industrial and commercial activities, and even today six Boston men occupy positions on the Board of Directors—Gordon Abbott, Oliver Ames, George Peabody Gardner, Francis L. Higginson, Robert Treat Paine, II, and Philip Stockton.

When the time was ripe for a merger of the Thomson-Houston and Edison interests, the incorporators found little difficulty in embodying in the nomenclature of the new corporation the initial letters of these three great inventors, and to T H E were added the descriptive words "General Electric Company," thereby giving to the world THE GENERAL ELECTRIC COMPANY.

The gains following this consolidation were enormous. The engineering and inventing forces of the two companies were able to spend their undivided efforts in furthering the development of more perfect types of electrical apparatus instead of wearing themselves out in attempts to avoid infringing the patents of the rival company. The sense of relief which the removal of these obstacles brought to them was shared not only by the business officials, legal advisers, engineers and inventors, but by all engaged in the business, while the benefits flowing to customers was equally great.

During the years that have elapsed since that important day—April 15, 1892, to be exact—electricity, then something read about in the newspapers but little understood, has become indispensable to civilization. Nearly everything in our daily life is affected in some way by the many uses to which this agency has been put. The General Electric Company, and its predecessors, have been largely responsible for the electric light, the electric locomotive, the hydro-electric generator, the steam turbine, the present-day power transmission practice, the electric ship propulsion, radio communication, and many other epoch-making developments.

The name of Elihu Thomson means much not only to those who live and walk with him today in Lynn, where is located his laboratory, and in Swampscott, where he resides, but to the entire world, for it has been through his inventive genius that mankind has been given more conveniences, more comforts and more opportunities to gain a living than were possible before he conquered electricity.

Still in the service of The General Electric Company he has assumed his position in the history of industrial America as one to whom in the early days of the electrical art was vouchsafed a prophetic vision of the alternating current phenomena.

In addition to his inventions of arc lighting apparatus, electric welding, which bears his name, and the electric meter, fundamental patents were granted to Professor Thomson between 1879 and 1885 covering a system of induction coils or transformers connected in multiple which thus made possible the practical use of the alternating current. In the files of The General Electric Company is a photograph of the sketch, prepared by Professor Thomson, showing the original application of "grounded secondary," a protective precaution now utilized on large lines throughout the country. In 1888, with his advice and assistance, coupled with that of E. W. Rice, Jr., and Charles J. Van Depoele, the method of continuously applying a contact to a rotating carbon brush, without the destructive wear and arcing by the copper brush, was evolved.

Over 500 patents have been issued to Professor Thomson since 1879 and he has been honored for his inventions as few Americans have been. In 1889 and 1900 he was awarded the Grand Prix, at Paris, for electrical inventions, and in 1889 he was decorated by the French Government as Chevalier and Officer of the Legion of Honor, for electrical research and invention; at St. Louis, in 1904, he received the Grand Prize, for electrical work, and in 1902, he was the recipient of the Rumford Medal. In 1910, he was awarded the First Edison Medal, by the American Institute of Electrical Engineers; in 1916, the Hughes Medal of the Royal Society of London, and he also is the possessor of the Elliott Cresson and the John Fritz Medals, as well as numerous others.

HIS LATEST EXPERIMENT IS OF WORLD-WIDE INTEREST

Perhaps the most significant answer that has been made in this century to the oft-repeated charge that the spirit of inventive and scientific genius is dead in Massachusetts is found in what is now transpiring at the West Lynn Works, of The General Electric Company.

When the International Education Board, one of the Rockefeller Foundations, conceived the project of creating for the California Institute of Technology a mirror of glass, twice the size of the one installed in the largest telescope in the world at Mount Wilson, near Pasadena, Cal., in 1920, and when the plan was approved by the officials of that observatory, which is a branch of the Carnegie Institution, to whom did the board turn for advice, counsel, and for the experimental and completed work?

To none other than Elihu Thomson, director of the Thomson research laboratory, at the River Works, of The General Electric Company, at West Lynn, because it was he who first suggested fused quartz as a material for lenses and mirrors as far back as 1902.

Thanks to the sufficiently large endowment of the International Education Board he is intensively at work on the project and in an experimental way is hoping to turn out a mirror two hundred inches, or sixteen and two-thirds feet, in diameter or twice the size of the one now serving the Mount Wilson observatory, which will be constructed for a telescope of a magnitude such as Galileo or Tycho Brabe never thought of in their wildest dreams.

When completed the telescope will probably be mounted on the top of Mt. Wilson, although the possibility of the glare of the electric lights of the nearby city of Los Angeles may make it desirable to carry it into a region south of that location, but wherever it is stationed it is believed that a glass of this mammoth size will bring the planets so near that once for all the presence of life, animal or vegetable, on Mars, may be deter-

mined. But what is of still greater importance is the belief that the astronomer will be able to project his vision farther into space and examine more closely the great universes that exist beyond the realms of our own galaxy than has ever been accomplished since the dawn of civilization.

The use of quartz for this 200-inch mirror marks a distinct step forward in experimental science. Ordinary glass for a mirror of this dimension would be totally inadequate because of its relatively large expansion under heat and contraction under cold. Today, the 100 inch telescope on Mount Wilson is equipped with a mirror of glass whose temperature may be controlled by special jacketing, but the results obtained are not uniformly satisfactory.

A mirror of quartz, such as Prof. Thomson is working on, will not require protection by any such device, inasmuch as quartz is not as responsive to heat and cold as glass.

The initial stages of the work are already under way at West Lynn. A series of "blanks," have been cast in an electric furnace operating at the almost unbelievable temperature of 1,800 degrees centigrade, or just under 3,500 degrees Fahrenheit. These "blanks," gun-metal in color, resembling grindstones in form and composition, are made of fused quartz-sand, and possess all the characteristics of pure quartz, save that of transparency. Harder than glass, they are, nevertheless, much lighter because of the tiny bubbles that permeate the blanks.

To prepare the blanks, quartz sand is placed in a cylindrical carbon and subjected to extremely high temperature, in the electric furnace, and after the quartz has fused the heat is withdrawn and the blank permitted to cool, following which it is ground flat, and transparent quartz is deposited on the upper surface.

When the experiments have reached a stage approaching the larger mirrors, the blank will be given a parabolic upper surface before transparent quartz is added. The most successful method of depositing the pure quartz on the blank has been to employ pulverized quartz-crystal, which resembles "snow ice." Flames containing the quartz powder are directed toward the surface of the blank, thus melting the powder which as soon as it strikes the mirror surface "freezes" and becomes as clear and transparent as pure ice.

When completed the 200-inch blank of fused quartz-sand will be approximately 30 inches in depth and will weigh from 25 to 30 tons. The transparent fused pure quartz deposited on the rough blank will probably be from one-half to an inch in thickness, and on top of this, when ground to great accuracy, the real "mirror," a coating of thin silver, which will take a high polish, will be placed.

The blanks that are now being cast vary from ten inches to two or three feet, but these are but preliminary to the work involved on the larger and completed blank. Plans for the actual construction of the telescope have not been drawn as yet.

The 200-inch aperture in the new telescope to be installed will represent as great an advance over the 100-inch instrument of 1920 as the latter did over Sir. William Herschel's four-foot product of 1789, which, in turn gathered in 500 times as much light as Galileo's tiny instrument of two and a quarter inches.

Man will be able to see double the distance hitherto possible. The 100-inch telescope of 1920 shows about 2,000,000 nebulae. Scientists assert Professor Thomson's product ought to show 16,000,000.

The making of this stupendous reflector is the greatest undertaking

of its kind ever attempted by man, and it is significant that a Massachusetts scientist and a Bay State laboratory were selected to produce the lens, which astronomers believe will show stellar wonders in the heavens two sextillion (2,000,000,000,000,000,000,000) miles away, or twice as far as with the largest telescope now in use.

THE GROWTH OF THE WEST LYNN WORKS

Building A at the West Lynn Works of The General Electric Company where was first begun in the closing days of 1883 the manufacture of electrical apparatus, and in which the old Thomson-Houston Co. made its first pronounced success, is today a hallowed structure. At the time it was erected by Minot Tirrell it was considered the last word in factory construction, but its three stories, with a basement, and its wing, 75 by 55 feet in the rear, make it appear somewhat antiquated when compared with the more modern buildings surrounding it. The original boilers and engine house, about 36 feet square and the blacksmith shop, 25 by 15 feet, contained a total area not as large as a single room in the plant of today. A large iron planer, a milling machine and drill, several lathes, a 75-horse power Putnam engine, manufactured in Fitchburg, together with two 60-horse power boilers, comprised the original equipment. When first occupied, the basement of the building was devoted to the manufacture of dynamos, while the lower story of the main building was occupied by the electricians, draughtsmen and pattern makers. Today, the original building is used for the manufacture of electrodes and general tools.

Factory B was built in 1886 and here arc lights were produced. Today it is occupied solely in the production of tools. The next year, Factory C was erected for the manufacture of stationary and railway motors, and direct current generators. That same year Factory D was added and became the original meter unit, also housing Professor Thomson's original laboratory. Afterwards by the addition of a third story it was used as a general machine shop and drafting department.

Factory E was built in 1888 for a paint shop, but is now used for electrode manufacture. In 1889 Factory G was erected to provide additional quarters for the executives and engineers, who, at that time, were scattered throughout the other buildings. At the time it was constructed it was considered to be the last word in buildings of this character, and it was anticipated that it would provide ample space for all future needs. It is still used for office and recreation purposes.

Factory H was also erected in 1889 as a receiving, shipping and storage unit and is still used for these purposes.

In 1890 four more units were added—Factory I, originally built as a brass foundry and now used as the carpenter's shop and for storage; Factory K, which was the original power house; Factory L built originally to take care of the expanding railway work, but now used for miscellaneous manufacture, and Factory Q originally constructed for the Thomson Welding Co., and later used for the American Ordnance Co., but bought from the latter concern in 1902, and extended in 1902 and 1903 for the assembly and test of stationary motors, and now used for miscellaneous purposes.

No more building was done at the West Lynn Works until 1899 when Factory M was erected to take care of the growing meter and instrument department, the structure being especially constructed for that purpose. It now houses the standardizing laboratory and instrument assembly department.

In 1902 Factory Q North was built for the assembly and test of meters and is still used for that purpose.

In 1908 Factory V was erected to house the general machining work and the manufacture of insulations and in 1910 Factory W for general manufacturing and winding and Factory X for the manufacture of magnets and the finishing department, were built, a large extension being made to the latter in 1913.

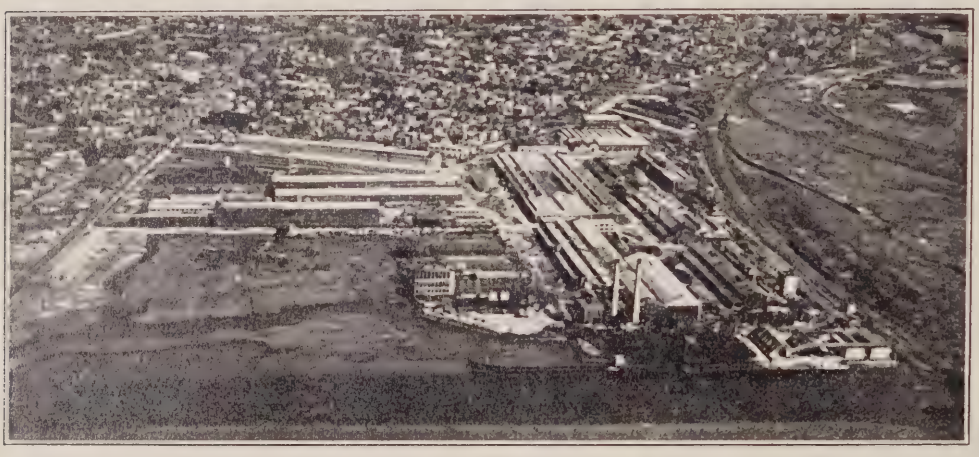
The latter year Factory S was built as a tower for a proposed four story structure to be used for general manufacturing but today it houses the engineering and production offices.

In 1914 Factory M Extension was erected for the manufacture of rectifier tubes and Tungar tubes are also produced there today.

The West Lynn plant covers 741,832 square feet, or 17 acres of floor space, and employs 3,000 hands. It is equipped with 2,499 machine tools of all kinds, and has a capacity of 13,000 meters weekly, 1,500 instruments, 600 rectifier tubes, 4,500 Tungar bulbs, 350 condensers, 3,000 reflectors and 45,000 electrodes.

THE DEVELOPMENT OF THE RIVER WORKS

The terrain upon which the River Works stands was, until the early nineties, mostly marsh land, and at high tide portions of it were under water, which flowed in from the Saugus River. When it was seen that the



AIRPLANE VIEW OF THE RIVER WORKS OF THE GENERAL ELECTRIC COMPANY, LYNN

area owned by the company at the West Lynn Works would not be sufficient to take care of expansion negotiations were started as early as 1889 to acquire land on the Saugus River marshes, and in 1892, some eighteen acres lying between Western Avenue and the tracks of the B. & M. R. R., were bought.

All castings used at the old Thomson-Houston Works had been obtained from outside foundries, entailing added cost and often much delay in getting out the finished product, therefore, the first consideration upon the acquisition of this area was to establish iron and steel foundries, and both were completed and began turning out castings, in 1893, the steel unit being denominated Building 30 and the iron foundry, Building 31. Both have been largely extended in the intervening years and the style of constructions of the extensions modified from that of the original struc-

tures. While the foundries were under way, Building 32 was erected and placed in service as a pattern and general woodworking shop. The original structure was of brick and timbers, while all extensions that have been added are of steel construction.

In 1893 Building 36 was completed and devoted to annealing and enameling sheet iron laminations, and in preparing insulating cloth. Building 51, erected in 1899, was devoted to general woodwork, this department having been transferred from Building 32. It was so employed until the erection of Building 77, in 1908. Building 51 was afterwards in use for various purposes until recently when it was razed to make room for a large extension to Building 63.

In 1902, Building 66 was erected as a pipe shop, and was later used for the installation at Lynn of the first horizontal turbine, in 1903, and still later as a core shop for the foundry.

Building 63 was constructed and put into service for transformer manufacturing and shipping department purposes, in 1903, and when the manufacture of power and lighting transformers was transferred to the Pittsfield Works in 1907, a portion of the first floor was devoted to turbine winding, and is still so used.

The year 1903 also witnessed the completion and occupancy of Building 64, which has since been greatly extended, and is used for the manufacture of steam turbines.

The first vertical turbine for furnishing power to the River Works was installed in the west end of Building 64, and was started in 1904. The power plant boiler room is also located at the West end of that structure and has a rated boiler capacity of 6,800 horse-power. In 1911 an annex to Building 64 was built to house the power plant turbines, the installation now consisting of four, with a total rated capacity of 11,500 KVA.

In 1903 Building 69 was constructed for restaurant purposes of the employees and the next year Building 50 was erected for the wire and installation departments, having been extensively enlarged in 1906, 1913 and 1920.

In 1906, Building 42 was erected as a forge shop, and it was enlarged in 1914 and again in 1917.

Building 57, erected in 1906, for the gear and pinion department has been enlarged from time to time since then to take care of the hardening of gears and pinions, and to meet the growing demand for refinements in this type of apparatus.

In 1906 Building 73 was erected by roofing over a portion of the area between Buildings 32 and 63 and is devoted to the storage and shipping of gears, pinions, railroad motors and other apparatus which could not be distributed directly from the departments in which manufactured.

In 1907 Building 74 was added for the production of stationary motors, and was greatly extended in 1910, 1913 and 1917 until today it stands as the largest structure in the world devoted exclusively to the manufacture of electric motors.

In 1908 Building 77 was erected as a pattern shop and for the storage of patterns as well as for general woodworking uses, relieving for other purposes various buildings previously used for such work. It was materially extended in 1910.

In 1911, Building 40 was constructed for occupancy by departments transferred from the West Lynn Works. Most of the third floor houses the apprentice department; the second floor being devoted to street lighting specialties and the ground floor to fabroil gears. During the World

war, the latter floor was largely devoted to the manufacture of shells for the European Governments.

In 1911 Building 41 was completed and put into service, the ground floor serving as a receiving department and general stock room, and the second as a brass foundry. In 1912 and again in 1915 large extensions were made to this structure and are devoted to coremaking, pattern storage and special press work and electric welding.

In 1911 Building 77C was erected as a destructor plant to take care of the combustible waste products of the River Works, and being located near the woodworking shop the shavings and sawdust can be fed to the boilers by an exhaust system.

In 1913 Building 46 was completed as an oil storage plant, being especially fitted for the economical handling of oils and allied products in barrels.

The next year Building 45 known as the Administration Building was completed and occupied, at which time all the administration offices were transferred from the West Lynn Works.

In 1914 Building 56, a modern garage, was completed, replacing inadequate quarters formerly occupied at the West Lynn Works.

Two years later Building 59 was erected and is the general plant repair shop.

In 1917 Building 67 was added and greatly extended the following year and is devoted to punch and forming press work and to the manufacture and repair of dies.

The same year Building 60, housing the dispensary and employment office, was completed and the next year Building 68 was erected as an extension of Building 45, and is devoted to experimental and research work. In this structure Professor Thomson has his office and headquarters, and here are also located the chemical and physical laboratories, while the top floor houses the photograph gallery.

Building 75 was erected in 1921 as a pipe and general repair shop, but has been used much of the time since in the manufacture of special marine apparatus.

There are at the River Works almost 102 acres of land owned by the company, of which 2,298,450 square feet, or 52.8 acres are covered by buildings. On the average 10,000 men and women find employment in this plant which is equipped with 5,448 machine tools of all kinds, and with 5,797 motors whose aggregate kilowatt rating is 20,504.

Indicative of the growth of the Lynn plants since 1900 there were 620,000 square feet of manufacturing space in both the River and West Lynn Works, that year, against 3,610,000 square feet today.

The River Works are the second largest of the General Electric plants, and where the company's engineers, in 1892, the year of the consolidation, spoke of generators in terms of hundreds of horse-power, today they casually refer to this type of apparatus in terms of thousands and even tens of thousands of horse-power.

The truth is that the age of electricity has only begun and there stretches ahead a vista of untold possibilities.

In the twelve plants of the Incandescent Lamp Department of The General Electric Company, one of which is located at East Boston, approximately 7,000 men and women are employed in producing Edison and National Mazda incandescent lamps, vacuum tubes, and accessories, such as glass, bases, wire, etc.

At the Everett plant, 278,468 square feet of floor space are utilized,

while upwards of 600 employees are carried on the rolls. The story of this unit is treated in the summary of the industries of the city of Everett.

THE HOAGUE-SPRAGUE CORPORATION THE LARGEST PAPER-BOX CONCERN IN THE WORLD

Lynn also boasts of the largest paper-box concern in the world, whose history dates back almost eighty years. It was in 1851, at a period when few paper boxes were manufactured, that George H. Cushman, an Amherst young man, having invented a machine that would produce paper boxes, came to Lynn, and established the business in a small way, the firm name being changed to S. Sargent & Son, in 1865. In 1877, Thomas Brothers, box manufacturers of Peabody, took over the Cushman & Sargent concern, and, in 1898, Charles E. Sprague purchased the business from Thomas Brothers, and formed the Chas. E. Sprague Box Co.



WHERE THE PRESENT HOAGUE-SPRAGUE CORPORATION, LYNN, BEGAN BUSINESS IN 1849

Eight years later, H. Morton Hoague bought the Sprague concern, and, in 1908, Charles F. Sprague entered the company, which, in 1919, became the Hoague-Sprague Corporation. It was in 1908 that the era of consolidations began which eventually made the Lynn corporation the biggest unit of its kind in the country. That year the box business conducted by F. E. Vincent, of Lynn, was consolidated with the Chas. E. Sprague Box Co., and, in 1919, it bought the paper-box business operated by F. A. Hosle, of Boston. Immediately following the formation of the Hoague-Sprague Corporation, the paper box concerns of B. E. Grover, of Lynn, A. G. Potter, of Swampscott, and George H. Allen, of Lynn and Beverly, were consolidated with it, and, in 1924, the corporation bought the Warner Box Co., of Boston, the Metcalf Box Co., of Marblehead, and the Commercial Box Co., of Lynn, while the firm of Littlefield & Moulton, of Lynn, was consolidated with the corporation.

In 1925, the biggest competitor of the Lynn concern—the H. Bridgman Smith Co., of Brooklyn, N. Y., was bought, and in 1927, the Weston Box Co., was purchased.

In 1925, the United Shoe Machinery Corporation acquired an interest in the Hoague-Sprague Corporation, but Messrs. H. Morton Hoague and Charles F. Sprague still continue in managerial positions.

In addition to the Lynn plant, the corporation operates branch units in Beverly and Newburyport, and Brooklyn, N. Y., and maintains more

than a dozen agencies throughout the country. Practically all the machinery in the several plants is automatic, and the concern has been the leading factor in bringing about the standardized shoe carton. There is still in the employ of the corporation Charles Campbell, who began his connection with S. Sargent & Son, in 1872, and who, after fifty-eight years of constant service is a valued assistant. Altogether upwards of 500 employees are carried on the payroll.

THE THOMSON-ELECTRIC WELDING CO.

The Thomson Electric Welding Company was organized in 1888 for the purpose of exploiting the basic patents on resistance welding evolved by Prof. Elihu Thomson. Today, the business consists of the design and manufacture of all types of electric resistance welding equipment used principally by manufacturers of metal goods where parts are made in large quantities.

The automotive industries are the larger users of resistance welding equipment of all types. Practically all metal parts of an automobile—with the exception of those made from castings—are fabricated by the use of spot, butt or seam welding equipment. Metal bodies are spot welded or butt welded throughout, while rear housings, drive shafts, etc., are butt welded.

A large number of butt welders are used by the manufacturers of drills, reamers and other cutting tools—particularly where the cutting portion of the tool is made from high speed or alloy steel joined to a shank of lower grade material.

Another industry using a large number of spot welders is the metal toy industry which, by the use of resistance welding equipment, is able to manufacture toys from sheet metal at a price which makes their sale in chain stores possible.

Railroads are among large users of resistance welders—particularly butt welders for the welding of locomotive flues and super-structure work of steel Pullman cars.

The field for the use of resistance welding equipment is growing rapidly and already its use in the fabrication of beams and trusses for the structural industry is changing from a possibility to a reality.

Late in 1929 the Thomson Electric Welding Co. consolidated with the Gibb Welding Machine Co., and a new Massachusetts Corporation, known as the Thomson-Gibb Electric Welding Co., was formed, which acquired the assets of both concerns, paying therefor $750,000 seven per cent preferred and 28,750 no-par class A shares to the Thomson unit, and $250,000 preferred and 14,375 no-par class B shares to the Gibb Co. The Thomson concern will continue its corporate existence and its holdings in the new enterprise will not be distributed for the time being.

George A. Cutter is president of the $350,000 corporation, Elihu Thomson, vice president, D. J. Lyne, secretary, and H. P. Reed, treasurer.

THE BOSTON MACHINE WORKS CO.

Since 1895 the Boston Machine Works Co. has devoted its attention to the inception and introduction of high-grade machinery that would increase the productive ability of shoe operatives, enabling them to produce higher grade workmanship with less strain upon the worker.

The concern maintains another plant in Boston, for the manufacture of all kinds of materials for embossing shoes in gold, silver or colors, and has developed this process to a high degree by the introduction of especial-

ly designed machinery for performing the work on a practical commercial basis. This method enables the manufacturer to postpone the stamping of any trade marks until the shoes reach the packing room, thus avoiding losses that might be brought about by last minute cancellation or other causes.

Charles E. Riley is president of this $100,000 corporation, which employs upwards of 125 operatives.

FOSTERING THE "CASH AND CARRY" SYSTEM

In 1881, Josiah B. Blood, of Lynn, starting with the proverbial "shoestring" opened a modest but typical New England grocery store, in Lynn, the entire initial stock representing the outlay of a comparatively few dollars and the services of a single clerk.

As late as 1907 the J. B. Blood Co., was operating but one store, but it did a gross business that year of $1,473,000. Ten years later it had two units in operation and its gross sales had jumped to $3,788,000. At the close of 1927 it was operating four stores, employing 1,000 persons, making gross sales of $6,500,000 and had total assets of $2,871,488, as against $667,000 in 1917. The company's bakery turns out 145 separate products and the automatic machinery with which it is equipped has a capacity of 3,500 pounds of bread every hour of the day.

A third of the capital stock of $1,790,000, is owned by the 800 employees, and the enterprise has grown to a point where its plant and equipment, less reserves, stands on the books at $2,020,435, with the book value of the common stock fixed at $139 per share.

Here is an instance of a New Englander founding and fostering a "cash and carry" business that has been successful from the start.

C. O. Blood is president, A. K. Blood, treasurer, and R. E. H. Preston, secretary, of the corporation.

In 1896, Thomas W. Gardiner began the manufacture of lasts, and in 1912 erected the present three story factory, which is now operated by the United Last Co. under the name of the T. W. Gardiner Co. Seventy-five hands are employed. Mr. Gardiner later established the Excel Shoe Form Co. Some years ago he was granted a patent on a finishing knife for turning lathes. W. L. C. Niles is president and treasurer of the Excel Shoe Form Co., which employs twenty operatives.

In 1905, Jonas S. Barnet, with his sons, Solomon S., and Lucius J., formed the firm of J. S. Barnet & Sons, leased the Pevear tannery, and began the manufacture of high grade calf leathers. Five years later the property was purchased, and since that time six additions have been made to the plant, where 800 calf skins are produced daily. The concern is capitalized for $1,000,000.

S. J. Barnet is president and treasurer, and H. J. Barnet, secretary of the corporation.

In 1906, the Benz Kid Co., No. 1, capitalized at $2,000,000, which now employs 450 hands in the manufacture of glazed kid leather, was formed by Jacob C. Benz and Louis M. Winslow. The latter's son, Edward M. Winslow, is now treasurer of the original company and of the Benz Kid Co., No. 2, which employs 300 operatives, and has capital of $300,000.

In 1928, A. M. Creighton, who began shoe manufacturing, in 1878, sold his modern shoe factory, of steel and concrete construction, and the largest unit of its kind in Lynn, to the Consolidated Electric Lamp Co., of Danvers, which concern now occupies the unit, and employs 1,200 operatives there in the manufacture of incandescent lights and radio tubes.

The lamp concern acquired 100,000 square feet of manufacturing space, in addition to the 60,000 it occupies in Danvers, as the result of this transaction.

SOME OF THE REPRESENTATIVE CONCERNS OF LYNN

The A. E. Little Co., capitalized at $2,275,000, employs 1,200 operatives, and since the sale of the A. M. Creighton plant, in 1928, for other purposes, the Little concern ranks as the largest individual shoe unit in the city. Alexander E. Little is president, Walter S. Little, vice president and treasurer, and Stacey A. Marble, secretary.

Of the upwards of 100 local manufacturers of shoes there are two concerns employing 450; two, 400; three, 350; one, 300; two, 250; one, 225; five, 200 each; nine, 150 each; two, 125 each; thirteen, 100 each; two, 80; four, 75, one, 60; six, 50 each; five, 40 each, and the remainder under the latter figure.

It would be idle in a work of this nature to attempt to catalog the present-day concerns, as the situation is constantly changing, new concerns appearing, and old ones removing or liquidating, but among the prominent units are Gregory & Read Co., employing 450 operatives, F. E. Gregory being president, and H. M. Read, treasurer; L. W. Kenney & Co., owned by L. W. Kenney, employs 150 workers; the Mitchell-Welch Shoe Co., with capital of $62,500, employs 150, Thomas A. Welch being president, Louis Farina, vice president, Edward C. Welch, secretary, and R. H. Mitchel, treasurer; Williams, Clark & Co., a partnership made up of E. F. Clark, F. B. Scott, F. A., and Addie E. Donahue, employ 200 operatives, and Watson Shoes, Inc., with capital of $150,000, employ 225 workers, Albert N. Blake, being president, Frank C. Stetson, vice president, and Charles Gleason, treasurer, of the corporation.

The Harwood Counter Company, of which Charles W. Harwood is president and treasurer, employs 100, in the manufacture of shoe counters and leather, the concern being capitalized for $75,000; C. L. Hauthaway & Sons, Inc., with capital of $150,000 employs seventy-five in the production of blackings, cements, dressings, tanners' finishes, and waxes, C. L. Hauthaway being president and H. Willis, treasurer, of the company and whose history is treated at length in the chapter devoted to Boston; J. L. Libby & Son, owned by Walter M., and Walter S. Libby and Walter N. Durgin, employ thirty, in the production of cut soles, and the Lyons Counter Co., with capital of $30,000, employ 100 in the manufacture of sole leather counters, J. H. Durland being president, A. L. Little, secretary, and P. F. Munsey, treasurer.

In the leather field are the Hilliard & Merrill Company, with capital of $500,000, employing 100 in the operation of cut soles and sole leather, and of which D. G. Ong is president and treasurer, and L. M. Newhall, secretary, and the R. Dietz Leather Co., Inc., employing 100 in the manufacture of glazed kid and upper leather, of which R. Dietz is president and treasurer, and many others employing a lesser number of hands.

In the shoe findings industry practically all branches are locally represented, and in many instances by sizable concerns, some seventy or more manufacturing boot and shoe cut stock and findings; ten or more producing lasts or related products; a dozen engaged in manufacturing blacks, stains and dressings, and as many more models and patterns.

Naturally enough, many local machine shops and foundries have sprung up where are produced the metal appliances requisite to the shoe industry, the Boston Machine Works Co. being among the oldest and largest, em-

ploying 125 operatives; the W. J. Young Machinery Co. being prominent as a producer of shoe machinery and nails. The latter concern is capitalized for $85,781, H. A. Young is president, W. J. Young, treasurer, and M. V. Rhodes, secretary. L. Christianson manufactures safety devices for elevators.

The Bay State Thread Works, cotton sewing thread manufacturers, whose main plant and office are in Springfield, operate a sizable plant in Lynn.

The Fisk Rubber Co., of Chicopee Falls maintains one of its wholesale houses in the city; the Jersey Ice Cream Co., of Lawrence, operates a branch plant in Lynn, and Wadsworth-Howland & Co. also have a branch in the city.

Thos. P. Nichols & Son Company caters to the printing and publishing needs of the Lynn factories, Thomas A. Nichols being president and Fred H. Nichols treasurer.

The calendars of the Perry & Elliott Company, which concern employs 150 hands, and is capitalized for $90,000, cover the globe. F. S. Elliott is president and treasurer.

The R. E. Goodman Co. manufactures wooden novelties for a rapidly expanding market, and employs 75 hands. R. E. Goodman and Edward F. Wolff constitute the partnership.

The Rotary Machine Company, manufacturers, at its 312 Beacon Street plant, the Rotary French and Truing Machine, which rolls a true and an extremely thin or heavy stock with no adjustments required; the Rotary Tape Laying Machine and the Grip-Shu-R tape. The corporation has capital of $90,000, and employs 25 operatives. Jerome P. Byron is president, Carl Tongberg, vice president, and A. R. Ridderstrom, secretary and treasurer.

McNichols & Taylor, Inc., of which Edric R. Taylor is president and Thomas T. McNichols, treasurer, employ 75 operatives in the manufacture of lasts.

The Keystone Sole and Shank Co., located at 601 Washington Street, and operating a Haverhill plant, at 169 Washington Street, in the latter city, manufactures the Pollard, Keys. Co. duplex arch support shanks and the patented moulded turn shank.

That the city is attractive to industrialists is shown beyond dispute when it is recalled that in the years of 1926 and 1927, and the first eight months of 1928, seventy-one new industrial concerns, employing 3,132 with annual payrolls of $4,700,000, located in Lynn.

In 1926 accessions were the A. & G. Shoe Co., Boot Brothers, Central Machine Co., Century Shoe Co., Chester Shoe Co., F. H. Dewing & Son, Fair Sex Shoe Co., Thomas F. Fitzgerald, Bond Shoe Corporation, Headway Shoe Co., Clifton E. Hunt, Hy-Sil Mfg. Co., Lynn Modern Shoe Co., Martin Counter Co., Mascott Wood Heel Co., Miller Made Dress Co., Modern Pattern Co., Novelty Wood Heel Co., Oriental Parlor Furniture Co., Paramount Shoe Goods Co., Parco Specialty Co., Postar Furniture Co., Premier Shoe Goods Co., Shoe City Wood Heel Co., Goniprow Kid Co., I. Lunder & Co., Masco Drug Co., and the New England Musical Case Co.

In 1927 the following concerns began business in the city: Adhesive Products Co., M. & R. Shoe Co., Harry Kashishian Shoe Co., Creme-Freze of Lynn, Inc., Styler Shoe Co., A. & E. Pitman Mfg. Co., Federal Shoe Co., Marmon Shoe Co., Bondway Wood Heel Co., Cushman Bakery, Graves Blacking Co., Frank C. Meyer Co., W. S. Bessett, Superior Machine Co., Marstin Adhesive Co., Vode Patent Leather Co., Maxwell Shoe Co., Ran-

dall Shoe Co., T. F. Corcoran, Lennox Shoe Co., Inc., Daly's No. 3 Shoe Factory, Yale Shoe Co., Canvas Products Co., L. & L. Radio Co., Wear-Ever Shoe Co., Hitching & Stephens Corp., J. B. Blood Bakery.

In 1928 these manufacturing units were added during the first eight months of the year: George G. London Mfg. Co., Joseph Shaw, J. T. Kershaw Wood Heel Co., Supergrade Heel & Leather Co., New England Shoe Co., Consolidated Lamp Co., Northern Light Co., Sol. J. Waxelbaum, Inc., Union Tanning Co., Chaves Shoe Co., Dandy Sealer Co., Nelmer Shoe Co., Brophy Bros. Shoe Co., Danvers Shoe Co., and the Lynn Stitchdown Shoe Co.

Through the activities of the Industrial Bureau of the Chamber of Commerce sixty-four concerns have located in Lynn during the past four years, sixteen of the total establishing themselves there in 1929. They are now employing 750 operatives, utilizing 128,000 square feet of floor space, and are providing annual payrolls in excess of $1,150,000. The concerns that began business in 1929 were: H. Bass & Son, Batchelder & Paisner, the Beacon Enameled Products Corporation, the Durkee-Mower Co., the Elgin Shoe Co., Morey-Winterfield, the National Stay Co., the Park Leather Co., the Raynor Co., the Reliable Curtain Co., the Shalit Shoe Co., the Textile Knitting Co., the Superior Counter Co., the United Sportswear Co., and the Weinstein Shoe Co.

In 1927 the total value of all products manufactured in the 359 local establishments was $105,991,962, this total having risen $10,961,019, in the six-year period between 1921 and 1927, while wages increased in the same time $1,634,329, the total amount paid to the city's 20,708 wage earners in 1927, being $28,474,514.

The value of shoes locally produced in 1927 was $26,696,393, with 6,646 employees on the payrolls of that industry, and in the boot and shoe cut stock and findings industry the value of products that year was $14,191,-913, with 1,158 wage earners, the combined product of these two industries representing 38.6 per cent of the total for all local manufactures, in 1927.

In the leather branch the value of the 1927 products was $9,133,034, an increase from $7,841,161, in six years.

Lynn's rank among the thirty-nine cities of Massachusetts is seventh. It is obvious that of the total value of local manufactured products the greater percentage is represented in the commodities fabricated by The General Electric Company but this total cannot be presented separately without disclosing the operations of an individual establishment.

CHAPTER XVII

LAWRENCE

LEADS THE WORLD IN THE PRODUCTION OF WOOLENS AND WORSTEDS

The city of Lawrence, now the largest woolen and worsted manufacturing center in the world, turning out one-fifth of the total value of these products fabricated in New England, showing a 30 per cent increase in the value of that output of these goods since 1924, a municipality of almost 100,000 souls, and holding rank as the fourth city in Massachusetts in value of manufactured products, was not even a village one hundred years ago. At that period only a few farms, possessing grazing land, running along the banks of the Merrimack River, afforded income for the handful of citizens residing there.

But engineering knowledge developed the information that the stream dropped fourteen feet from a point just above the Lawrence town line to one just below the municipal terrain, and that spelled potential water power, and, in 1850, that factor meant mills and factories. The influx of Boston capital created a mill city almost overnight and for nearly a mile on both banks of the stately Merrimack there tower the red brick walls of manufacturing establishments, although today they derive only about 12 per cent of their power from the flow of the stream.

DANIEL SAUNDERS DISCOVERS THE "WHITE COAL" OF LAWRENCE

Lawrence is the smallest "large city" in the United States. With a land area of but 6¾ square miles, its 94,270 people are squeezed into a territory less than half the size of Lowell, and about one-fifth that of Nashua, whose population is but a third of that of Lawrence.

As is so often the case in tracing the development of New England industrial centers, one learns that the history of the founding and early growth of Lawrence may be said to have resulted from the work of one man—Daniel Saunders, of Andover, who became interested in the project by the merest accident.

Some time before 1835, Saunders came into possession of a plan showing the grades and locks for a canal from Lowell to tide-water on the Merrimack. Studying it closely he concluded there was considerable aggregate fall of water between the two points, though there was little individual fall in the few slight rapids.

With a companion and equipped with a straight edge and spirit level he went over the falls between the two points, and discovered the great power hidden in the insignificant rapids.

In 1840 he began purchasing land at the head of Peters Falls, some distance above where the first mills were built, and also bought an island and some land farther down. Soon he had sufficient realty to control Peters Falls, and thus the whole power of the river. He had acquired enough land by 1843 to deem it safe to lay his plan before J. G. Abbott, John Nesmith, and Samuel Lawrence, all residents of Lowell, and there was formed by this group the Merrimack Water Power Association, with Daniel Saun-

ders, Jr., Abbott Lawrence, Thomas Hopkinson, and Jonathan Tyler, of Lowell, and Nathaniel Stevens, of Andover, as the other stockholders.

It was proposed to call the new town Saunders, but Mr. Saunders objected, suggesting that, as it was on the Merrimack River and as there was then no town in Massachusetts by that name. it be called Merrimack, and so it was known until April 17, 1847, when it was incorporated as a town and took the name of Lawrence, in honor of Abbott Lawrence, one of the subscribers to the enterprise.

On March 20, 1845, Daniel Saunders, Samuel Lawrence, John Nesmith and Edmund Bartlett, received a charter under the name of the Essex Company. Abbott Lawrence and John A. Lowell offered $30,000 over and above the reimbursement of all expenses previously incurred for the rights and interest of the Essex Company. The proposition was accepted and Mr. Lawrence who was the first and largest subscriber to the Essex Company, owning a thousand shares, became its first president.

A great dam was completed across the Merrimack September 19, 1848, canals were dug, and the town site was laid out, work being begun August 1, 1845.

The real beginning of manufacturing there had its origin in the formation of the Lawrence Machine Shop, which was built and owned by the Essex Company, between 1846 and 1848, and operated by that concern until 1852.

Locomotives were among the first products turned out by the company, the "Essex" being built and used between Lawrence and Boston, while many engines were sold to the Erie and other steam railroads then in their infancy.

The Hoadley Portable Engine, which achieved extensive celebrity was built by John C. Hoadley a few years later, the local works being established on the North Canal. Here, also, steam fire engines were made by Thomas Scott and W. S. Bean, the first one built, the "Lawrence," being purchased by the city of Boston.

In 1852 the Lawrence Machine Shop Co. took over the Essex Company's shop, the new concern being capitalized at $750,000, and five years later, when the financial depression of 1857 struck the country, the buildings were sold to the Everett Mills Co.

In 1845 the Bay State Mills, of Lawrence, were projected with $1,000,000 capital and in February, 1848, the main building, nine stories high, was opened, the first cloth being turned out the following June, while the River Mills, three to five stories in height, and 1,480 feet long, were begun and by 1850 there had been woven in that plant 315,000 Bay State woolen shawls.

In 1857, during the period of depression, the plant was shut down and remained idle for two years, at the end of which time a new company was formed, with capital of $1,600,000 known as the Washington Mills, and the buildings were taken over, 2,500 employees being hired, and the manufacture of woolen goods, twilled blue flannels and opera flannels was commenced. At that time the plant had 1,025 water horse-power, and two 500 horse-power steam engines. In 1886 the property passed to a new corporation called the Washington Mills Co., and the old buildings were razed and modern structures erected.

In February, 1846, The Atlantic Cotton Mills Co. was incorporated with $2,000,000 capital and on January 12, 1849, the first consignment of raw cotton for this plant reached Lawrence. The mills were sold in 1864 to the Pacific Co., for use as the lower Pacific Mills.

THE ROMANCE OF THE PACIFIC MILLS

The original Pacific Mills, even then the largest works of their kind in the world, were incorporated in 1853, with $2,000,000 capital and they have had one of the most consistent and progressive records of any textile concern in Massachusetts or New England. From their inception the managers have been far-seeing and imbued with humanitarian ideas, the concern being the winner of the second of ten prizes of 10,000 francs each, offered by Emperor Napoleon III, of France, at the Paris Exposition in 1867 for the care of the material, intellectual and moral welfare of employees, this being the only prize award made to an industrial concern in either the United States or Great Britain, and the selection being made from 500 contestants.

Pacific Mills have recently completed twenty years under their present management, and it is interesting to note the progress made during these two decades, comparative figures showing an almost phenomenal growth of the concern since 1907.

Twenty years ago the net annual sales of the corporation approximated $12,500,000. In the first six months of 1927 net sales aggregated $21,471,000, or almost four times what they were in 1907.

The total net sales in the twenty year period ending July 1, 1927, amounted to $626,974,000, and the net income after all deductions was $37,570,000. During that period more than $25,000,000 were paid to stockholders in dividends.

It was in 1907 that Edwin Farnham Greene, assumed charge of affairs. During his administration, which continued until 1928, large additions and many improvements were made to the Lawrence plant, while new units were erected at Dover, N. H., and Columbia and Lyman, S. C., making the total increase of floor space 130 acres, or from 68 to 198 acres.

When he became its head the company operated 179,960 cotton spindles; today it has 546,752. In 1907, the corporation had 53,064 woolen spindles, and in 1928, it operated 96,912 of that type. When Mr. Greene became chief executive of the corporation, its payroll embraced 4,939 men and women; when he left it there were 10,800 employees. The net sales were approximately $9,000,000 in 1908; they exceeded $44,000,000 in 1927, and in 1920, the largest year, they rose to $66,000,000. The assets of the corporation under his regime rose from $8,000,000 in 1907 to $60,000,000 in 1928, and during his term of office upwards of $25,000,000, were paid in cash dividends, and $29,000,000 in stock dividends.

In 1907, the corporation had in its print department twenty-five machines. Today, it operates 51.

In 1827, the Cocheco Manufacturing Co., was incorporated as a print works, but it was not until 1909, that the plant, then consisting of cotton mills, print works, and a velvet mill was absorbed by the Pacific Mills.

THE WORLD-WIDE DISTRIBUTION OF ITS GOODS

Carrying coals to Newcastle would seem to be no more superfluous than sending American cotton cloth to Manchester, the great English cotton center. Yet, cotton cloth made and branded by Pacific Mills is sold in the drapers' shops of Manchester, England.

This is indicative of the world-wide distribution of the products of the mill. From Tahiti in the South Seas to the Scandinavian peninsula, Pacific fabrics are on sale in the markets of the universe.

The salesmen of the concern go far afield and compete successfully with

European manufacturers. Fifty-nine countries are customers of Pacific Mills.

Increased demand for American cotton fabrics in a number of British markets is shown by present trade figures of the export department of the concern. Shipments of so-called wash goods to Australia have increased almost 100 per cent compared to 1925, in the Pacific lines. The company's exports of flannels to Australia have also increased substantially. The same tendency is reported in exports to South Africa and New Zealand.

This trend is striking in view of the long-established position of England as a great exporter of cotton cloths, and the fact that a preferential duty is faced by American fabrics in the competition with British goods.

SOME AMAZING FIGURES

Picture if you can an area of more than 235,000 acres, where all the public buildings, parks, railroads, factories and stores, as well as the homes occupied by five and a half million people, are suddenly swept away by a giant cataclysm of nature, and in their place nothing but a field of growing cotton is seen on a terrain as large as that embraced within the municipal limits of Boston, Philadelphia, Pittsburgh, St. Louis, Washington, Providence and Albany combined.

It would be a plantation as broad as an inland sea, and would extend far beyond the range of your eye, or the comprehension of your mind.

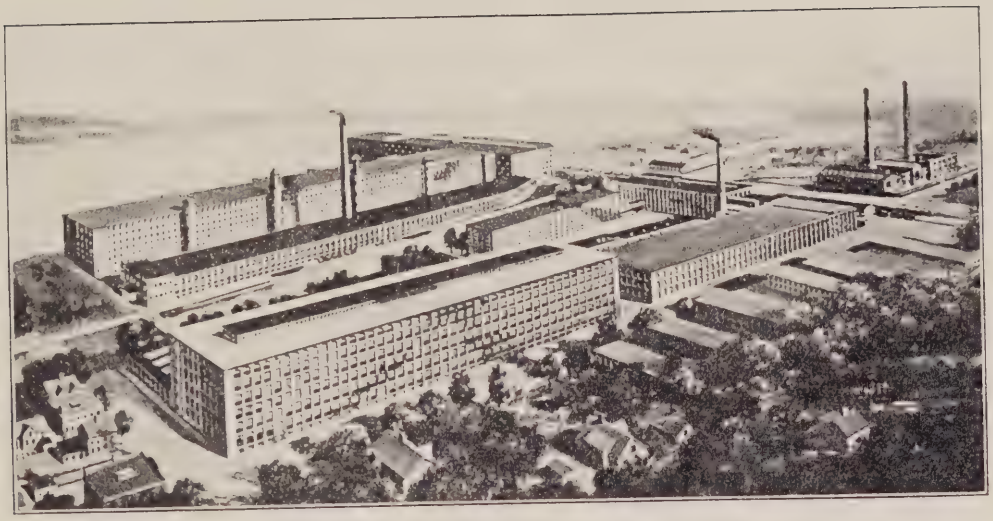
And yet the normal annual yield of this tremendous acreage, about 70,000 bales of raw cotton, would be but a single year's supply for the capacious maws of the looms operated by the Pacific Mills.

Undoubtedly, like almost everybody else, at some time in your lifetime, you have been afflicted with insomnia, and, in order to lull yourself to sleep, you have resorted to the famous old antidote, of trying to count sheep jumping a fence. If you believe that sort of mental gymnastics to be efficacious start your new born babe counting tonight up to one hundred sheep, and have him continue to exercise through infancy, boyhood, and manhood, until he reaches the age of sixty-five years by which time he will have succeeded in enumerating the 2,366,400 sheep that provide only enough wool to meet one year's requirements of the Pacific Mills.

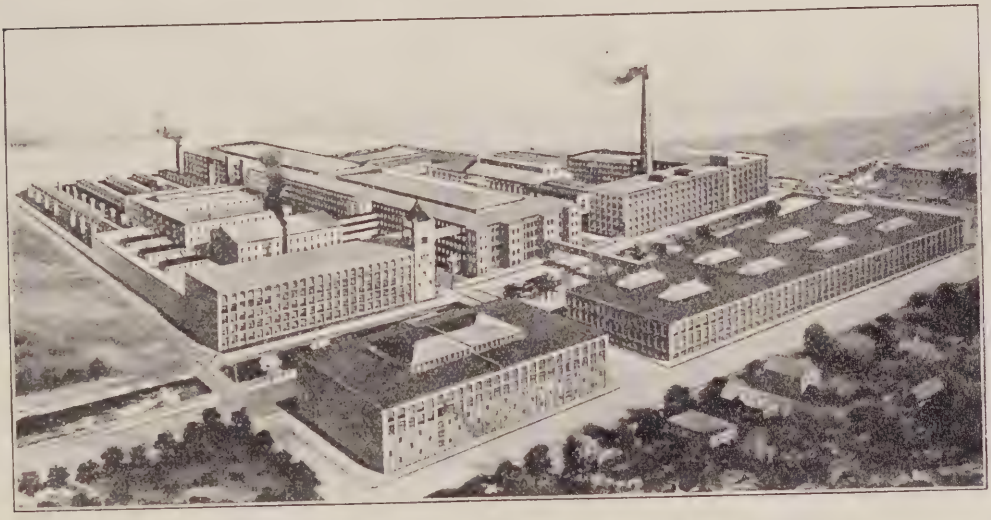
To make use of these vast quantities of raw cotton and raw wool, to say nothing of the millions of yards of gray cotton cloth annually purchased by the Pacific Mills, the company has the mechanical equipment in its plant, capable of producing 1,400,000 yards, or about 800 miles of finished textile fabrics, every working day of the year.

If Colonel Lindbergh should tie one end of this yardage to the Woolworth Tower in New York City, he could pay out behind the "Spirit of St. Louis" a continuous stream of Pacific Mills cloth till he reached the Washington Monument, in the national capital, and, after circling that towering shaft, he could spread a return streamer back to the Metropolis, and still have enough left from one day's production to turn over to the operator of the Colonial Air Transport, Inc., a quantity sufficient for the latter to start from New York, leaving a streamer hitched to the Brooklyn Bridge, and on arrival at Boston could attach the other end to the Custom House Tower, besides leaving enough to connect the latter structure, with the Hotel Lafayette, in Portland, Me.,—a mere 800 mile journey all told.

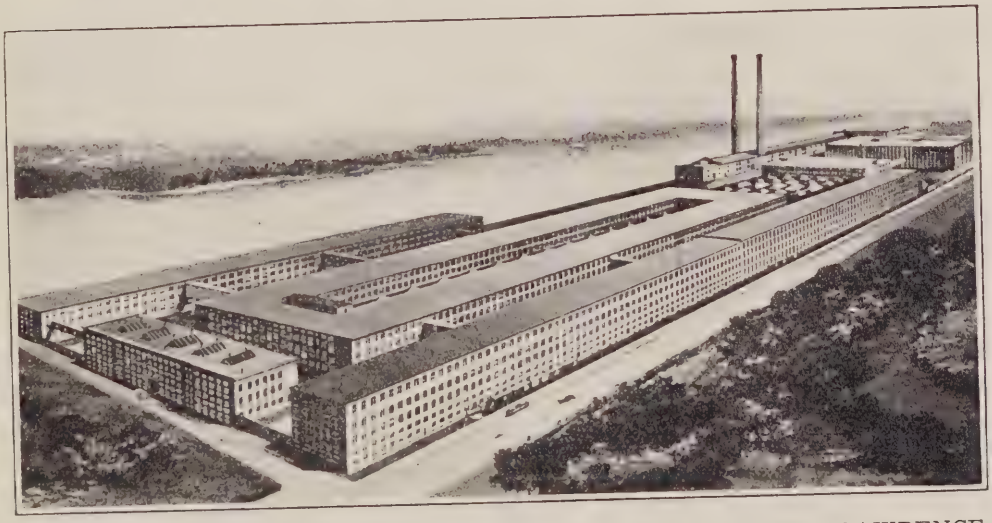
If around-the-world fliers could carry with them in their planes the annual output of finished cloth made by the Pacific Mills they would be able to wrap the globe with seven and a half thicknesses of cotton and



PACIFIC MILLS COTTON DEPARTMENT, LAWRENCE



PACIFIC MILLS WORSTED DEPARTMENT, LAWRENCE



PACIFIC MILLS PRINT WORKS AND BLEACHING DEPARTMENT, LAWRENCE

worsted goods, and then have enough left to provide plenty of habiliments for themselves.

THE PHYSICAL LAY-OUT OF THE PLANTS

To maintain production on such a scale, the Pacific Mills, located at Lawrence, Dover, N. H., Columbia, and Lyman, S. C., occupy seventy principal buildings and utilize in manufacturing processes more than 8,500,000 square feet, or upwards of 198 acres.

Many of the major units are five or more stories in height, and installed on their floors are 666,560 cotton and worsted spindles, and 11,796 looms, which, if placed end to end, would reach from Boston to Ashland, Mass., or a distance of twenty-four miles.

The power houses at the Lawrence plant alone have 124 enormous boilers, which consume upwards of 20,000,000 gallons of fuel coal each year. In the service of the Pacific Mills are 10,500 skilled textile operatives to whom are paid in wages $12,500,000 annually.

In each week of forty-eight working hours, 750,000 yards of cotton cloth are woven in the cotton department of the plant, the main structure at Lawrence being 805 feet long, 72 feet wide, and seven stories high, equipped with 100,000 cotton spindles, and 1,800 cotton looms, with 1,600 more looms in a two-story factory adjoining. These spindles and looms are driven by power provided by the Merrimack River. Adjacent to the power house, where 15,000 horse power is developed by oil, for light and power purposes, is the cotton yarn mill, containing 51,400 more spindles, and a large storehouse for the finished goods.

Here, too, is one of the worsted department mills, 550 feet long, and 130 feet wide, with six 16-foot stories and a basement, while the adjoining weave shed contains more than 1,000 looms.

All the gray cloths woven in Lawrence, and at the Columbia, S. C., and Dover, N. H., plants are printed, dyed, bleached and finished, in the print works and bleaching department, at Lawrence, the group of buildings there devoted to these processes including ten modern structures, of brick and concrete construction, occupying about eighteen acres on the south shore of the Merrimack. One room of the print works is 723 feet long, and installed in it are forty-eight of the fifty-one printing machines, located in Lawrence—the largest straight away installation of such machines, under one roof, in the world. No other concern on the globe employs so many printing machines as the Pacific Mills.

The dye house, at Lawrence, is 723 feet long, by 252 feet wide; the bleach house is 252 by 180 feet in dimensions, and contains eighty bleaching kiers, each with a capacity of 50,000 yards of cloth, the eighty kiers having a total boiling capacity of 370 tons of print cloth a day—the largest bleaching capacity in the world.

As much as 3,762 miles of finished cloth have been produced and packed within a working week of five and a half days, at Lawrence, and the capacity of the print works and bleaching department there is 6,500,000 yards, or in excess of 3,693 miles of finished goods a week.

At the Cocheco Department, in Dover, N. H., are 150,144 cotton spindles, and 3,596 looms, housed in 934,304 square feet of floor space, while at Columbia, S. C., there are 202,048 spindles and 4,800 looms, engaged in the production of gray cloth, all of which is shipped to Lawrence, or Lyman, S. C., for printing. The latter plant has a four-story cotton mill, 290 by 136 feet, a bleachery, 653 by 196 feet, a finishing building, and boiler and filter plants, providing floor space of about 500,000 square feet.

The Pacific Mills management is solicitous of the welfare of its employees, providing not only modern buildings and equipment, well lighted, and with sanitary conditions of the best, but food warmers for those who bring their noon-day lunches, fresh milk in bottles, rest and first aid rooms, industrial physicians and nurses, and a cafeteria, while at the Columbia plant 650 cottages are owned by the corporation, as well as a large community building, with over 300 dwellings, owned by the concern, in Lyman, S. C.

SOME OF THE INDUSTRIES OF THE FIFTIES AND SIXTIES

In the early fifties, Edward Page manufactured oak tanned leather belting, cotton spinning banding and power loom harness, belt and top-roller cement, cotton and woolen covers, top rollers and iron pulleys, at a plant on Turnpike Street, Lawrence, near the B. & M. station.

The Lawrence Duck Company was incorporated in 1852, with $300,000 capital and today is a lusty septuagenarian employing 200 operatives in the manufacture of cotton duck. Its capital today is $400,000, Theophilus King is president, William A. Barrell, secretary and agent, and William L. Barrell, treasurer.

In 1860 the Everett Mills were built, the corporation starting with $800,000 capital which was later increased to $2,100,000. The company purchased one of the buildings belonging to the Lawrence Machine Shop Co., and in that structure the initial production of cotton goods was begun.

The Pemberton Mill Company was formed in 1853, but the mills remained idle from 1857 to 1859. In the latter year the concern was incorporated as the Pemberton Mfg. Co. At about 5 P. M., on January 10, 1860, without a moment's warning the main building of the plant collapsed, carrying 600 out of the 918 employees into the ruins. Soon after the fall, fire broke out and fourteen perished in the flames, 87 altogether being killed in this most awful of mill disasters in New England. Forty-three other employees were severely injured, two of them being disabled for life. Immediately there was started a fund by public subscription which soon reached $65,579.29. Official investigations which followed the fall of the mills revealed the fact that the disaster was due to the use of defective iron columns. The plant was rebuilt in 1860 and operations began in the following year, the company having at that time a capitalization of $450,000. Today, The Pemberton Co. employs 700 hands in the manufacture of glazed cotton wadding, the plant being equipped with eighty-three cards, and complete dyeing and finishing departments. Nathaniel Stevens is president, and William T. Dowling, treasurer, and a Boston office is maintained at 78 Chauncy Street.

The Lawrence Woolen Mill, known for many years as Perry's Mill, was incorporated in 1864, with $150,000 capital, for the manufacture of fancy woolens, and was the progenitor of the present successful George E. Kunhardt Corporation, capitalized at $2,000,000 and employing approximately 1,000 operatives in the production of high grade woolen goods, the unit being one of the leading manufacturing concerns in its field. George E. Kunhardt is president, William J. Bland, secretary, and George E. Kunhardt, Jr., treasurer of the corporation.

THE STORY OF THE ARLINGTON MILLS

On February 26, 1865, just before the close of the Civil War, a group of courageous Massachusetts capitalists incorporated the Arlington Mills, with a capital of $150,000, which, in the intervening years has been in-

creased to $12,000,000, and began the manufacture of worsted fabrics for men's and women's wear, taking rank today as one of the largest cloth producing plants in the world. Noted for the staples such as serges, cheviots, shepherd's checks, all of which are of uniform construction and standard types, the mills are also equipped for weaving fancies and novelties, according to changes in fashions.

Securing its raw material in the United States and from Australia, New Zealand, South America, Cape of Good Hope and all the great wool markets of the world, the management from the beginning has stressed quality as the prominent feature of its products.

In Lawrence are located the combing and spinning mills, three weave rooms and the dyeing and finishing plant; while an auxiliary plant is operated at Methuen. In the combing mills not only the wool needed for tops for the spinning mills is treated, but also a large amount of wool is combed on commission for other spinners and for dealers in tops. The combing unit has a capacity of 550,000 pounds of tops per week, of which total the spinning mills require 220,000 pounds to make the yarns needed to keep all the looms in the various weave rooms in full operation. The spinning mills have a weekly capacity of 200,000 pounds of worsted yarn of all counts and grades required for the different varieties of cloth to be manufactured and the 2,870 looms in all the weave rooms produce about 400,000 yards of cloth per week.

The Arlington Mills own fifty-six acres of land in Lawrence and the total floor area of manufacturing space in that city is 54.3 acres. The corporation produces 31,700 horse-power at its central plant, in Lawrence, by steam-driven turbo-electric generators. Upwards of 1,000 acres of land in New Hampshire are owned or controlled by the corporation, including water power privileges and reservoirs to insure a full and constant supply of water for the dye-houses and finishing department at Lawrence. The mills are equipped with 129,384 worsted spindles and afford employment to an army of 7,250 men and women.

The first plant, built in 1865, which was burned in October, 1866, and was located on the Spicket (Spiggot) River, in Lawrence, on the site previously occupied by the Stevens pianoforte factory, was solely operated by water power, through the medium of a 60 horse-power turbine, which equipment, compared with the present-day 31,700 horse-power central station, shows the great advance made by the corporation in the sixty-five years of its existence. The second mill was erected in 1867, and was occupied by the corporation until 1888, when it was razed, and superseded by the present enormous Lawrence plant.

In its earlier years cotton and woolen yarns, women's worsted and cotton dress goods, woolen suitings, alpacas and mohairs were manufactured. Today, the Arlington Mills rank next to the American Woolen Company and the Pacific Mills in the industrial life of Lawrence. Progressive management, close observation of the trends of the market, the installation of up-to-date machinery, and careful consideration of the welfare of its army of workers have all conspired to give it its present commanding position in the industrial affairs of the Commonwealth.

Albert H. Chamberlain is treasurer, Franklin W. Hobbs, president, and Harry A. Wright, clerk of the corporation.

In 1864 the Wright Manufacturing Co. was formed for the manufacture of braids and had a highly successful corporate existence for more than forty years.

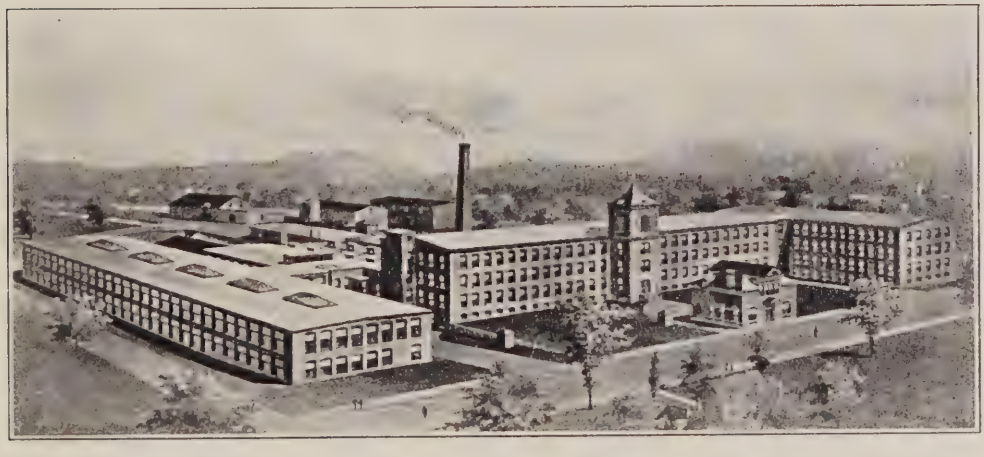
Then followed in rapid order the inception of the Merrimac Braid



ARLINGTON MILLS, 1865
Burned October, 1866



ARLINGTON MILLS, LAWRENCE, 1928



HOOSAC WORSTED MILLS DEPARTMENT, ARLINGTON MILLS,
NORTH ADAMS, 1925

Mill, the Globe Worsted Mills, the Prospect Worsted Mills, the Butler File Co., the Lawrence Flier and Spindle Works, the Downing Rubber Co., the Stanley Mfg. Co., the Stedman & Fuller Mfg. Co., producers of card clothing, which subsequently removed to Providence, R. I.; the Lawrence Bleachery, established in 1877; the Spicket and Wamesit Mills; the Merrimac Machine Shop, formed in 1853; the Lawrence Line Co., producers of fish lines; the Archibald Wheel Co., incorporated in 1888, with $60,000 capital and operating before that time as a partnership, and still producing wheels in large numbers, the concern being capitalized for $200,000, and employing 100 men, Frank M. Andrew being president, J. E. Andrew secretary and Albert A. Meader treasurer; three large foundries—the Merrimac Foundry Co., Edmund Davis & Son, and the Messrs. Webster & Joslyn, the Davis unit still operating with seventy-five operatives, and being owned by James F. Lanigan, the concern being housed in one of the most modern foundry buildings in New England; and the L. Sprague Shuttle Co., formed in 1864 for the manufacture of bobbins and spools.

THE RISE OF THE BEACH SOAP CO.

Years before Lawrence even had an established name, and before the dam rose on the site of Bodwell's Falls to provide the foundation for the textile industry which in later years was destined to bring the city to the fore as the world's greatest woolen center—Lurandus Beach, Senior, in a small one story factory in Dover, N. H., began the manufacture of the first Beach soap.

It was of the old fashioned soft type and the process was crude, but it was such a superior product, and so cheaply wrought, that our great-grandmothers, who were obliged to concoct their own washing ingredients, hailed it as a boon to the housekeeper, and acclaimed the product as one of the greatest instruments for the benefit of mankind.

Its humble beginning recalls the age-old axiom that—"Big oaks from little acorns grow," and in 1845, two years before the "new city" was incorporated as the town of Lawrence, Lurandus Beach, Sr., removed from Dover to the Merrimack River town and established the nucleus of the extensive plant which today occupies a large area at the corner of Maple and Lawrence streets.

His first product was followed a few years later by the introduction of hard soap in the form of plain rectangular bars, dark yellow in color, which were cut into pieces as required by the housewife. If Lurandus Beach did not make the first hard soap, he made it almost as soon as anybody else in the country. Later came the pressed and wrapped cakes so familiar to the women today. These cakes were first pressed in a machine operated by foot power and were wrapped by hand, quite in contrast to the modern automatic machinery for both pressing and wrapping now used by the company.

The Beach Soap Company instantly became a pregnant part of industrial Lawrence, and the local progress of the company was such that while one son, Lurandus, Jr., remained there to assist his father, another son, James, before the Civil War, was sent to St. Paul, Minnesota, to establish a plant. Upon the completion of that enterprise, he went down the Mississippi River and located another one at Dubuque, Iowa, and subsequently remained in charge of the dual proposition.

The three sons of James Beach still operate the Dubuque plant, but the St. Paul factory has since been sold. One of the company's proudest possessions is the little factory at Dover where the product was first

made, and it is still maintained as a distributing center for business in that section of New England.

A number of new products came into being as the years progressed. Two subsidiary concerns are controlled by the Beach Soap Company, one, the Beach Tallow Company caring for the rendering end of the business, and the other, the Mitchell Wing Company of Boston, at whose extensive establishment the Beach Soap Company maintains its Boston offices.

Wilbur E. Rowell is president of the Beach Soap Company; William E. Philbrick is treasurer and general manager and Robert Stanley is secretary and superintendent.

THE ADVENT OF THE EMMONS LOOM HARNESS CO.

The Emmons Loom Harness Co. was formed in 1867. Previous to that time T. A. Emmons, the founder, had busied himself in the groundwork of harness making at Saco, Me., Holyoke, Lowell and Newburyport. In the latter place he joined with a brother-in-law in the manufacture of loom harness. Wooden frames were made and sent out to the homes where the knitting was done by hand. It was Mr. Emmons' task to go from home to home, sometimes with a horse, but more frequently on foot, collecting the knitted harness.

In 1868, Mr. Emmons moved to Lawrence, and established his own business. Originally hired to act as manager, with an interest in the profit, he shortly purchased the business. In 1870 he erected a larger shop.

The concern started with two knitting machines and expanded from a small concern, occupying a wooden structure, which was destroyed by fire in 1876 to the present modern plant, with seventy-five machines and all accessories for modern production. The business saw a gradual development until 1889, when the first big expansion came and the Emmons product is now found in mills throughout the United States, Canada and Mexico. Thomas A. Emmons is president, Arthur L. Jenkins, assistant treasurer, Clarence Morrison, secretary, and Arthur B. Emmons treasurer of the corporation.

About 1880 paper making began to be carried on extensively on the river front, the first unit established being the Merrimac Paper Co., which began business in 1881, followed by the Bacon Paper Co., the Munroe Felt & Paper Co., which was incorporated in 1881, with $60,000 capital, and which is still active in the manufacture of wrapping paper and specialties, James P. Munroe being president and treasurer of the corporation up to his death, in 1929; and the Russell Paper Co., the pioneer paper unit of the city, founded in 1853, by William Russell and his son, Hon. William A. Russell, which was incorporated in 1864, and subsequently acquired by the Champion International Co., which operates it today, being capitalized at $3,000,000 and employing 600 hands, George F. Russell being president and treasurer, Charles T. Dole, vice president and W. D. Dole, secretary.

A few years after the founding of the Russell Paper Co., Hon. William A. Russell, perceiving the great possibilities in the invention of Henry and Christian Voelter, who patented their machine in the United States on August 10, 1858, to manufacture paper from wood pulp, became so much interested in the process that he hazarded his entire fortune in developing the machine. The Russell Paper Co. later absorbed the Cowles & Partridge, the A. & A. Norton and the Joshua Newton paper mills, and produced book and manila papers in large volume.

The Merrimac Paper Co., of Lawrence turns out daily 48,000 pounds of book paper, foundation stock for coating, and specialties, being equipped with eight beating machines, and two Fourdrinier machines. At its coating plant, located adjacent to the paper mill, it manufactures coated lithograph papers, enameled book and offset papers, and coated specialties. In 1887 John Theodor Janson, a native of Sweden, entered the employ of the concern, and during his long service as superintendent, he has invented a number of improvements in paper-making machinery, on which he has been granted several patents. The company is capitalized for $200,000, employs 250 operatives, and is managed by C. D. Thompson, president and treasurer, Augustus P. Thompson, vice president, and Frank S. Crawford, secretary.

THE DAVID BROWN COMPANY

The David Brown Company was started in a small way in 1883, employing at that time six men, while the factory occupied only 2,000 square feet of floor space. Today, over 200 are employed at the main plant and more than 150,000 square feet of manufacturing space are used.

The original concern was called the Union Shuttle Company, which manufactured shuttles only. In 1899, The Weld Bobbin & Spool Company was incorporated and the manufacture of a small line of bobbins and spools was started in Lawrence. In 1902, the William E. Bass Company which manufactured bobbins only, was purchased and in 1912 the bobbin and spool end of the business was reorganized. The shuttle business was still conducted under the name of the Union Shuttle Company. In 1922, the Lowell Bobbin Company of Newport, Vermont, was purchased, and the following year the Union Shuttle was absorbed by The David Brown Company, and both are now conducted under the one name.

The company also operates rough or blank bobbin and lumber mills in Maine and Vermont, is capitalized for $250,000, and is managed by David M. Brown, president, George Gibson Brown, treasurer, who, with J. M. and M. S. Brown, constitute the board of directors.

In 1884 Lawrence Sjostrom established a dyeing plant, in a small wooden building containing 1,800 square feet, from which grew the Lawrence Dye Works Co., a concern that ultimately occupied two and a half acres of space. It was one of the few units of its kind in America equipped to handle all types of fabrics, yarn, slubbing and raw stock in the bleaching, dyeing, printing and finishing processes, and its capital grew so that it could handle between 4,000,000 and 5,000,000 yards of cloth and 2,000,000 pounds of yarn or raw stock per annum.

NO OTHER CITY IN THE UNITED STATES PRODUCES SUCH A VARIETY OF PAPER-MAKING MACHINERY

Lawrence is the most important center in the United States for paper-making machinery, as well as the home of the largest manufacturer of the various knives used on pulp and paper-making machinery, from the woodpile to the finishing room. Eight substantial Lawrence concerns, all nationally known and many of them with international reputations, build a wide variety of paper-making machinery, and have $3,000,000 invested in plants, employ normally 500 men and do an annual business of $3,000,000.

The city manufactures a wider variety of paper-making machinery than any other one center; a larger total volume than any other city in the United States, while a buyer can purchase in Lawrence a larger per-

centage of the complete machinery required for making paper than in any other place in this country.

Many of these companies trace their histories to the days when the manufacture of paper and pulp was in its infancy, Lawrence being one of the oldest paper-making cities in the country, and they have played a considerable part in the development that the art has attained.

When it comes to large volume production with a minimum amount of labor through the use of highly specialized machinery, there are few industries which have made more progress than the paper trade, in which Lawrence machinery has played a large part.

Fourdrinier paper machines, taking liquid stock at one end and transforming it into a finished sheet of paper at the other, are today making paper twenty feet wide at the rate of a mile in length every five minutes, with the human labor of less than a dozen men. These machines are huge, a single machine constituting a train load.

Lawrence makes Fourdrinier and cylinder paper machines, beaters and jordans, pumps, sheet cutters, layboys, folders, reels, stuff chests, vats, doctors, press rolls, wet machines, and also all the various knives which include fly bars and bed plates for beaters, jordan fillings, paper trimming and sheet cutter knives, doctor blades, roll scraper blades, rag knives, chipper knives, and barker knives. It also manufactures numerous special attachments, devices, and parts for various paper-making machines.

The city is the home of John W. Bolton & Sons, Inc., the largest manufacturer of knives used in making pulp and paper, and the only concern in the United States not only specializing on these products alone, but also manufacturing every sort and type of knife used in making pulp and paper, from the woodpile to the shipping room.

The company is capitalized for $250,000 and employs 125 operatives. Its present officers are: President, John W. Bolton; treasurer, A. L. Bolton, and clerk, W. W. Bolton.

J. H. Horne & Sons Company, founded in 1888, build Fourdrinier and cylinder paper machines. They are also manufacturers of beaters and jordans and their machinery is operating in many foreign countries.

The concern is capitalized for $250,000, employs 150 operatives and is managed by B. F. Horne, president, and H. F. Horne, treasurer and secretary.

The Hamblet Machine Company, making Hamblet cutters and Hamblet layboys, is the largest manufacturer of sheet cutters in the United States and exports its products to many foreign countries.

The company is owned by G. W. Hamblet and upwards of eighty employes are carried on the payrolls.

The Dillon Machine Company developed the first "doctor" for calenders and other paper-making machinery, and also manufactures jordans, pumps, sheet cutters, and the Branon folders, the concern having capital of $54,000, fifty employees and being managed by William Morrison, Jr., president and treasurer.

The Lawrence Machine Company, owned by James F. Lanigan, employing thirty-five operatives, and the Lawrence Machine & Pump Company, of which Charles L. Lanigan is treasurer, employing thirty hands, are builders of pumps widely used in the paper and other industries, and vertical steam engines.

The Mills Machine Company, with a modern plant erected only a few years ago, produces a general line of paper mill machinery and has

recently put on the market an entirely new machine for the treating of waste papers.

It is capitalized for $200,000, and employs 125 operatives. Mellvin A. Mills is president and treasurer and C. W. Malonzo, vice president.

The Emerson Manufacturing Company manufactures cylinder paper machines and Emerson beaters and Emerson jordans which have been nationally known for nearly fifty years. About a year ago the concern suffered a disastrous fire, but none of its office records or foundry patterns were damaged. Following this loss John W. Bolton & Sons, Inc., took over the company, and an entirely new, modern plant was erected and equipped in a remarkably short space of time. By means of this action and the fine coöperation extended by other Lawrence paper machinery builders the company was able to fill all its orders without pause, and actually did a materially larger business in the year that the fire occurred than during the preceding twelve months.

Two of the Lawrence paper-making concerns operate their own iron foundries.

While most people think of Lawrence as being preëminently a textile city, men in the paper industry regard it as the home of paper-making machinery and of high grade pulp and paper knives of every description.

THE GEORGE E. KUNHARDT CORPORATION

In 1886 the George E. Kunhardt Corporation was established, the concern being incorporated in 1918, and now employs 900 operatives in the production of woolen and worsted men's wear, the plant being equipped with twenty-two sets of cards, 288 broad and eight narrow looms, 13,800 woolen and 1,120 twist spindles, nine boilers, and two water wheels, with a complete dyeing department.

The corporation has capital of $2,000,000. George E. Kunhardt is president and George E. Kunhardt, Jr., treasurer.

About 1890, Harry Lever conceived the idea of combing cotton by an entirely new principle, and being financed by an official of the Arlington Mills, built what was termed the Redmond-Leon comber, and four of the first machines produced were installed in the Howland Mill, No. 2, in New Bedford. The device, designed for the handling of shorter staples with a large production, had a detaching mechanism which advanced the lap to the cylinder intermittently, the cylinder being made of three small nippers that closed on the tuft advanced by the detaching mechanism in turn as the cylinder revolved. Just before the nippers closed on the tuft, the needle segment of the cylinder combed the end grasped by the nipper, and as the tuft was carried forward by the cylinder it was combed by the top comb, and after passing the latter it was pieced to the tuft that had preceded it, then drawn through rollers termed piecing rollers, and thence into a conductor or cylinder pan up to the table or silver plate in the ordinary way, and finally through a draw box. This was the second comber built in this country, and was strictly an American invention.

THE MONOMAC SPINNING COMPANY—LARGEST IN THE WESTERN HEMISPHERE

The critic of industrial Massachusetts finds himself completely confounded when he attempts to explain away the existence of a textile unit in Lawrence, which in a period of less than two decades has grown to possess a mechanical equipment of mule and ring spinning frames and of finishing machinery unrivaled by that installed within the walls of any other textile corporation in the western hemisphere.

The success achieved by the Monomac Spinning Company, which was organized in 1911, and incorporated two years later, but proves that textiles can prosper in Massachusetts, despite the allegation of pessimists to the contrary. Beginning operations in its plant at South Lawrence, with capital of $1,000,000 it found it necessary to increase this to $1,200,000, in 1916.

Four years later, when a 100 per cent stock dividend was declared, the capitalization became $2,400,000. It seems almost superfluous to direct the attention of the doubting Thomases that moribund enterprises do not present stock dividends to those who have invested capital in them, but surely it is pertinent to emphasize the fact that within ten years after the machinery of this corporation was started its officers were able to show profits that justified such action.

In January, 1921, the stock was increased to $5,000,000, at which figure it remains today. Plant growth has gone hand in hand with capital increases and today the Monomac Spinning Company utilizes 10.73 acres in its manufacturing operations, and storage space equal to 1.36 acres, thus giving it altogether in its magnificent modern brick plant upwards of twelve acres of buildings.

Included in its equipment are 83,200 spinning spindles, and 19,200 twister spindles, a total of 102,400, eight boilers, and electric apparatus.

The company's products are single and ply worsted and merino yarns, gauging from tens to seventies, all drawn and spun on the French system, and marketed to the knitting trade on cops, cones, or in skeins, and for the weaving industry on dresser spools or in skeins. All worsted yarns are in white, solid colors, fancy mixtures, double and twist, and vigoureux, while the merino yarns are produced in various mixtures as desired.

The mill purchases some of its wool in Australia, but most of the raw product is bought in Boston—the great wool center of the world. The cotton used in the merino yarns is rough Peruvian stock, which is also purchased in Boston.

The plant installation assures unvarying conditions for the work in all stages of progress, being equipped throughout with the latest apparatus designed to maintain the correct temperature and the degree of humidity required, while the machinery for the production of French spun yarns is the best existing either in America or France, having been manufactured for the corporation by the acknowledged leaders in French spinning equipment.

From the outset, uniformity of quality has been one of the chief objectives of the sponsors of the company, and its customers have found its yarns to be the same from one year to the next.

Hendricks H. Whitman, son of the late William Whitman, is president; John T. Bradlee is treasurer; Walter M. Hastings is agent; Frank C. Chamberlain is secretary, and Clifford W. Dow is the wool buyer of the corporation. The directors are Hendricks H. Whitman, John T. Bradlee, Franklin W. Hobbs, William Whitman, Jr., Charles W. Leonard and Malcolm D. Whitman. The company's selling agents are William Whitman, Inc., with offices in Boston, New York, Philadelphia, Chicago and Charlotte.

The Monomac Spinning Company has its Boston office at 78 Chauncy Street, and employs upwards of 1,300 operatives at the South Lawrence plant, which stands on a plot of land that was idle terrain less than a score of years ago.

OTHER LEADING INDUSTRIES OF THE CITY

Chief among other local manufacturing concerns are the gigantic plants of the American Woolen Company, including the Ayer, Prospect, Washington and Wood Mills, whose history is treated in the chapter devoted to the industries in the towns of Essex County. These four units are equipped with 333 worsted cards, 342 worsted combs, 3,358 broad and four narrow looms, 368,356 worsted spindles, 14,400 woolen spindles, and 3,000 twist spindles, with nineteen boilers and thirteen water wheels.

Other local concerns include one of the eighteen units of the Atlas Plywood Corporation, which operates plants in Lawrence, New Bedford, Lowell and North Adams, in this state, and which employs altogether 1,500 workers; Bride, Grimes & Company, with seventy-five employees engaged in steam and plumbing specialties, and owned by James H. Bride and E. Eben Grimes; the Curran & Joyce Co., Inc., producing carbonated beverages, capitalized for $75,000, and managed by John F. Murphy, president and treasurer, and Michael F. Lynch, secretary; George W. Dinsmoor, who for thirty-seven years has manufactured textile winding boards and paper winding cores, so indispensable in preparing for shipment many lines of textile fabrics and paper, and whose large and completely equipped plant has an annual output of approximately four million boards and cores; the Jersey Ice Cream Company, capitalized for $300,000, employing eighty in the manufacture of ice cream, of which G. William Kenison is president, E. O. Goudy secretary and Thomas E. Garry treasurer; the Morehouse Baking Company, with capital of $50,000, of which Philip I. Morehouse is president and Charles F. Smith, treasurer, employing 100 in the manufacture of bakery products; the Patchogue-Plymouth Mills Corporation, incorporated in 1919, with capital of $1,500,000, employing 1,000 operatives in the manufacture of wool and fiber rugs, of which I. D. Einstein is president, Milton I. D. Einstein, treasurer, and Charles E. McLean, superintendent; the Textile Shield Co., owned by J. Norman Anderson, engaged in manufacturing metal stampings; the Acadia Mills, incorporated in 1917, with capital of $3,000,000, employing 1,250 operatives, in the production of combed cotton yarns, the plant being equipped with 165 cards, sixty-four combs, 86,472 spindles, complete dyeing and finishing departments, and eleven boilers, H. H. Whitman being the president, F. C. Chamberlain clerk and J. Earle Parker the treasurer of the corporation; the John W. Barlow Co., established in 1865, and incorporated in 1903, with $20,000 capital, manufacturing webbing tapes and belting, Ralph W. Bevington being president and John H. Bevington treasurer and clerk of this unit; the J. F. Bingham Mfg. Co., of which Albert J. Moore is president and treasurer, engaged in sheet metal production; the Black-Iron Stove Polish Co., with capital of $70,000, manufacturing stove polish, Paul R. Fiedler being president and Richard P. Fiedler treasurer; the Farwell Bleachery, established in 1877 by Nathaniel W. Farwell, and incorporated in 1886, with present capital of $300,000, employing 350 operatives in bleaching, mercerizing and dyeing textile fabrics, including silk, mixed goods, cotton and silk piece goods, and artificial silk fabrics, and in finishing cotton piece goods, Nathaniel F. Ayer being president, Robert Vickery secretary and John W. Farwell, treasurer; the Alfred Kimball Shoe Co., with capital of $150,000, employing 300 operatives in the manufacture of shoes, Alfred Kimball being its president, A. R. Kimball treasurer and John S. Larrabee vice president and secre-

tary; the Henry Klous Co., with capital of $60,000, manufacturing shoddy, Henry Klous being president, Philip B. Marsden vice president, Ellen Brandy secretary and William F. Brandy, treasurer; the Lawrence Gas & Electric Co., capitalized for $4,150,000, employing 400 in the manufacture of gas and electricity, Fred H. Sargent being president, W. C. Bell, vice president and C. S. Herrmann treasurer; the Lawrence Lumber Co., with capital of $200,000, employing 100 operatives in the manufacture of wooden boxes and lumber, George W. Hamblet being president and Francis K. Lamprey treasurer; E. Frank Lewis, engaged in wool scouring, and employing 500 operatives; F. W. McLanathan & Son, owned by F. W. McLanathan, engaged in the manufacture of belting; the U. S. Bobbin & Shuttle Co., with capital of $1,925,000, engaged in the manufacture of bobbins, and employing 350 operatives, Luther C. Baldwin being president, Frank W. Wakefield secretary and George H. Wilson treasurer; A. G. Walton & Co., Inc., engaged in the manufacture of shoes, capitalized for $246,000, employing in its Lawrence, Chelsea and Manchester and Derry, N. H., factories, 3,000 operatives, Harry M. Wheeler being president and Arthur G. Walton treasurer of the corporation, and Walworth Brothers, Inc., incorporated in 1916, with capital of $200,000, employing 300 operatives in the manufacture of women's worsted dress goods, W. S. Sagar being president and treasurer, and R. Hodge secretary, the plant being equipped with complete dyeing and finishing departments.

The Gurnet Mills, owned by the Lowell Dye Works, employ 250 operatives in producing men's and women's wear woolens and worsteds and woolen felts, and are equipped with dyeing and finishing departments. In 1929 new dye house equipment was installed at the plant.

Henry Bauer began the manufacture in 1914 of fancy corset cloth, jacquard broad silks, cotton and silk goods and trimmings, and employs thirty operatives.

In 1921 William and Charles Beck, Inc., established the Spicket Mill and began the manufacture of linen fire hose, the plant being equipped with thirty-five looms and 150 twist spindles. Alfred E. Beck is president and L. B. Coggan, treasurer.

The same year McKenna and Bobbins began the production of cotton and silk corset cloth and employ thirty operatives.

The Mulvey Yarn & Dyeing Co., owned by J. A. Mulvey, is engaged in the dyeing of cotton, woolen and silk fabrics.

William Stuart & Co., operating the Essex Dye Works, is engaged in dyeing cotton and woolen yarns, braids and tapes, and employs twenty-five hands. James C. and Matthew Stuart constitute the partnership.

MacDonald, Hegel, McDonald, Inc., removed its plant to Lawrence from Los Angeles, Calif., in 1929, and began the production of the Perfection dishwashing machine in a local factory, which it purchased, and employed 100 operatives at the outset.

As the result of efforts of the Lawrence industrial bureau, formed to obtain new industries for the city, the Sorg Engine Manufacturing Co., of Flint, Mich., and Sheffield, Ala., moved to the city in 1928 and occupies a part of the plant formerly used by the Brightwood Manufacturing Co., a textile concern. The Sorg Company has erected a foundry since its advent, and manufactures an engine which uses gasoline, kerosene or ordinary fuel oil. Production is carried on at Lawrence, while the company's assembling plant will continue to be operated in the South.

SALE OF THE EVERETT MILLS PLANT IN 1929

Undoubtedly the most important industrial development of the present decade in Lawrence was the purchase, in the fall of 1929, by a New York syndicate, of the property formerly owned and operated by the Everett Mills, comprising factory buildings occuping more than thirty-four acres of floor space and about fifteen and one-half acres of land.

The 1,500,000 square feet of manufacturing space are to be used by twenty individual concerns in related lines of production, which will employ in the aggregate upwards of 5,000 persons.

The sale was described by the Lawrence Industrial Bureau as the greatest single industrial move in the history of Lawrence. It involves the transplanting of an entire specialized industry to one central point through the consolidation under one roof of a score of plants previously located in New York City, Brooklyn, Newark, Poughkeepsie, Buffalo and Detroit, and in this respect possessed special economic significance.

When the Everett Mills were numbered among the prosperous industries of Lawrence, they employed in the hey-dey of their existence not more than 1,800 operatives. but the new industries brought to the city, through this transaction, will employ approximately 5,000.

Long the leading city in the United States in the manufacture of woolen and worsted goods, in this, her chief industry, the product value of the same in 1927 amounted to $101,771,630, or 65.5 per cent of the total value of all goods locally manufactured in that year. The average number of wage-earners employed in this industry during the year was 17,465, or 70.1 per cent of the total for all manufacturing industries in the city. The industry ranking second in local importance is the manufacture of cotton goods, with a product value in 1927 of $6,108,356, and in which the average number of wage-earners employed during the year was 1,553. Other leading industries in Lawrence are the dyeing and finishing of textiles, the manufacture of paper, of foundry and machine-shop product (including textile machinery) and of boots and shoes.

Lawrence had 174 manufacturing plants in 1927, twelve being devoted to the production of woolen and worsted goods, six to cotton goods, twenty to foundry and machine shop products, including textile machinery, and the remainder divided between dyeing and finishing of textiles, paper, boots and shoes, food products, printing and publishing, wood working establishments, and confectionery, with sixty concerns representing varied industries.

That the city is not on the road to decadence is quite apparent when one observes that in 1921 the total value of all products manufactured in the city was $149,543,413, as against a total value, in 1927, of $155,456,975.

CHAPTER XVIII

HAVERHILL

THE SLIPPER CITY OF THE WORLD

Haverhill, long known in shoe producing circles as the "Queen City of the Merrimack," has been the center of shoe and slipper manufactures for almost three centuries.

The local production of hats, which continues to this day, began with the advent of the first hatter—Jonathan Webster, who began operations in 1747.

As early as 1789 the town had a sail cloth factory, the story of which is carried in the chapter of this work devoted to the early textile industries of the Commonwealth.

Andrew Greeley, who settled in the town in 1648, is supposed to have been the first local shoemaker, and from that year until the beginning of the nineteenth century, practically the only local industries were shoe and hat manufactories.

In 1795, Moses Gale advertised that he had several thousand fresh and dry hides, which he would exchange for shoes, and that he would give credit until the footwear could be made from the raw material—the earliest authentic information of what may be termed a local wholesale shoe venture.

Moses and James Atwood were among the earliest to engage in the manufacture of shoes. The former sent a wagon load to Philadelphia, during the period of the War of 1812, and realized a handsome profit on the venture. David How is said by some authorities to have been the first local manufacturer to send his shoes to the South. Wesley Balch is supposed to have been the first Haverhill producer of "roan" or morocco shoes. Among the other manufacturers of the decade between 1810 and 1820 were Amos Chase, Leonard Whittier, Aroch M. Hatch, Phineas Webster, Samuel Chase, Warren Whittier, Eliphalet Noyes and Thomas Meady, and they were followed by James Noyes, Moses French, Eben Chase, Daniel Hudson, John Follansbee and David P. Harmon.

In 1815 Haverhill boasted of two cotton and two woolen plants, numerous shoe, hat, horn comb, leather and glove factories, and a shop where plated ware for saddles and harness was produced.

THE ADVENT OF TURNED SHOES

By the '30s there were at least twenty-eight shoe manufacturers in the town, and the increase in production resulted from the finishing of goat, kid and sheep skins in the form of morocco, and from the invention of turned shoes, this type being introduced to Haverhill by a traveling journeyman, who had learned the art in Philadelphia.

The production of these light, neat, cheap and comparatively durable shoes, in place of the heavy styles then in common use, gave a decided impulse to shoe manufacturing in Haverhill, and by March, 1837, there were forty-two local producers, and fourteen tanners and leather dealers.

The financial panic of that year wiped out many of these concerns, and it was fully ten years later before full recovery was reported.

By 1857 there were upwards of ninety shoe manufactories and eighteen innersole and stiffening plants, and in 1860 approximately 94,000 cases of shoes were locally produced that year, valued at $3,754,240. The town then had an even 100 factories, ninety-eight of which were engaged exclusively in producing shoes, while two were manufacturing both boots and shoes.

By 1875 the local production of shoes had reached 150,000 cases.

As early as 1843 Haverhill began the manufacture of slippers, which type of product has ever since distinguished it from other shoe centers in the country.

In 1857 the first Singer sewing machine was locally introduced and was installed in Moses How's factory, at a cost of $400.

A census of shoe manufacturing units compiled on January 1, 1887, showed 170 local concerns in operation and 228,269 cases of shoes were shipped out of Haverhill the preceding year.

John E. Gale was the head of Gale Brothers, shoe manufacturers, for fifty-six years, the concern carrying on business locally until 1889, removing that year to New Hampshire. Mr. Gale was also president of the Gale Shoe Mfg. Co., of Haverhill, another unit which long operated in the city.

For more than a generation Charles K. Fox was one of the leaders in the production of shoes, having begun business in Haverhill, in 1882, and later he established plants in Wolfeboro and Norwood, N. H., and employed at the height of his career as many as 1,500 operatives. Mr. Fox was for many years the head of the Charles K. Fox Heel Co., and the Haverhill Shoe Mfg. Co.

THE BRADLEY-GOODRICH COMPANY, INC.

The original firm of the present-day Bradley-Goodrich Company, Inc., was founded in 1860 by the late Daniel Goodrich and Dudley Porter. From 1885 to 1887 the business was conducted by Hazen B. Goodrich alone, and in the latter year Hazen B. Goodrich & Company was established, succeeding the firm of Goodrich and Porter.

About six years ago Hazen B. Goodrich & Company and the Bradley Shoe Company were consolidated as the Bradley-Goodrich Company, Inc. The present capacity is about 800 pairs daily of women's high grade turn shoes and men's slippers. The company's officials are Frank J. Bradley, president, Everett Bradley, treasurer, and George W. Langdon, Jr., vice president.

CATERING TO MILADY'S WHIMS

Seldom do we realize when we look upon the ornaments of milady's shoes what an important part in the industrial life of Massachusetts is played by the specialty manufacturer, and how he changes his production according to the whims and caprices of the consuming public.

Not so many years ago leather bows were in vogue; then came the ribbon bow; the large pineapple bow and the Roman sandal ornaments; the era of the embroidered shoe and finally the advent of the beaded ornament, which is still popular.

But the styles in shoe ornaments at the present time cover a much wider range than formerly prevailed, due to the almost innumerable kinds of shoes produced today. The plain opera pumps are equipped with bows of leather or ribbon, or dainty buckles of metal or rhinestone; the strap shoes require tied bow effects, rhinestone buttons, or rosettes of leather or

ribbon; the colonial type of footwear has always been popular, and is supplied with buckles alone in the present fashion, while beaded shoes in a wide variety of patterns have become almost a staple.

The time was, not so many years ago, when the few makers of shoe ornaments produced most of the ornaments by utilizing the home workers. In 1873 the A. J. Dudley Company of Haverhill was the leader in this line and ultimately the house of Dudley was known throughout shoe manufacturing territory. In 1889, The J. A. Dalrymple Company entered the field in Haverhill, which city from the beginning has been the main theater of this shoe specialty production. In 1914 G. H. Pulsifer, Inc., was formed and thirteen years ago it became obvious that advantages were to be gained by consolidation of the various lines and the Pulsifer unit was merged with the Dalrymple concern. In 1923, Dalrymple-Pulsifer, Inc., entered into a consolidation with the house of Dudley, under the name of the Dalrymple-Dudley Co., thus bringing into a union two of the largest shoe ornament houses in the United States, and in normal times this concern produces 20,000 pairs of bows and shoe ornaments a day, employing in its factory 100 men and women, and from 350 to 400 outside home workers. Many devices and novelties have been invented by the company, the sale of which largely enhance the annual value of its products.

The history of this phase of shoe production but serves to indicate the growing importance of Massachusetts in the specialty field.

The Dalrymple-Dudley Co. has capital of $100,000, Frank E. Dudley is president, L. H. Ordway vice president, Joseph A. Dalrymple treasurer, George E. Dalrymple assistant treasurer, and C. H. Poor clerk.

THE C. H. HAYES CORPORATION

In 1884 Charles H. Hayes purchased what was then known as the George B. Wentworth Box Factory, entered partnership with Charles A. Varney, and began the manufacture of wooden boxes. In 1892 Mr. Hayes purchased his partner's interest and continued manufacturing paper and wooden boxes and shooks until 1903. That year the C. H. Hayes Corporation was formed with the following officers: President, C. H. Hayes; vice president, E. C. Wentworth; secretary and treasurer, W. C. Hayes.

At this time the concern carried on business at 30-36 Granite Street, the present location, and at that time an average of 125 workers were employed, while at an auxiliary factory in Farmington, N. H., twenty-five additional workers were carried on the rolls. Sawmills located throughout New Hampshire employed approximately a dozen or fifteen more.

In 1911 the wooden part of the Granite Street factory burned and this branch was moved temporarily to Hale Street. A brick plant was erected on the ruins of the wooden structure and the factory was then moved back to Granite Street, its present location.

In 1916 both C. H. Hayes and his son, W. C. Hayes, died, leaving E. C. Wentworth as treasurer and general manager of the corporation and Mrs. Nellie M. Hayes, the widow of C. H. Hayes, became president of the corporation.

The company has capital of $150,000 and employs upwards of 150 operatives.

CHESLEY & RUGG

About 1884 Monroe Chesley and William A. Rugg formed a partnership for the manufacture of shoes, and upon the former's death, in 1924,

Edward Granville Chesley, a son, became a member of the firm, with Mr. Rugg as the other partner.

At one period, women's turn and McKay novelty shoes, and men's turn house slippers and patent leather shoes, constituted the company's products, but today production is confined to women's McKay novelty shoes, of which 1,500 pairs are turned out daily, and men's turn slippers, 300 pairs of these being produced each day.

Three hundred hands are employed.

HAVERHILL'S ONLY TEXTILE INDUSTRY

In 1888 M. T. Stevens & Sons Company, of North Andover, then as now the only textile producing unit operating in the city, manufactured 800,000 yards of women's dress goods, using 500,000 pounds of wool, employing 150 hands at that time in the Haverhill plant, to whom $5,000 in wages was paid monthly.

THE MYER T. ORNSTEEN SHOE CO.

The present Myer T. Ornsteen Shoe Co. began business as a leather concern, on May 6, 1903, not entering upon the manufacture of shoes until 1920. At the outset, the founder, Myer T. Ornsteen, employed 100 operatives in the production of leather. Operations were then carried on at 76 Phoenix Row, and in July, 1920, the concern removed to Hale Street in order to secure adequate production facilities. The present daily capacity is 4,000 pairs of women's novelty McKay shoes, and upwards of 400 operatives are employed. Myer T. Ornsteen is the sole owner of the business.

THE RICKARD SHOE CO.

In 1914 the Rickard Shoe Company, founded by Edward M. Rickard, removed to Haverhill, from Lynn, and in the intervening years grew from a comparatively small manufacturing unit to one employing upwards of 800 hands, at the present.

In 1928 one of the most important developments in the local shoe industry in many years took place when the Rickard Company effected a merger with I. Miller & Sons, Inc., of New York City, the amalgamation bringing into existence one of the strongest producing organizations known to the women's shoe trade.

Edward M. Rickard became vice president and a director of the I. Miller Corporation, and has complete charge of the Miller manufacturing activities in New England. Henry C. Rickard was made an assistant to his father and Joachim D. Rickard, who had been secretary-treasurer and sales manager of the Rickard concern, retired to give his entire attention to other activities with which he had connection.

The Miller Company operates factories in New York City and on Long Island and large retail stores in New York, Philadelphia, Atlantic City, Chicago and Palm Beach, and has more than 300 agents throughout the United States.

The local factories of the Rickard concern are devoted exclusively to the manufacture of strong lines of women's turn shoes to retail at about $10 a pair.

Factories Nos. 1 and 2 and the company's wood heel plant were united under one roof.

THE L. H. HAMEL LEATHER CO.

Another twentieth century manufacturing enterprise which not only has grown by leaps and bounds since its inception, less than fifteen years ago, but whose executives have perfected a process in treating leather that has revolutionized the lining of shoes, providing added evidence that the inventive genius of Massachusetts is very much alive, despite assertions to the contrary.

In 1916 Louis H. Hamel, a Haverhill young man started in his individual name the tanning of leather, and as his sales increased from year to year and required additional executives to care for the expanding business the L. H. Hamel Leather Co. was incorporated in 1921, with two of the founder's brothers, Arthur A. and Herbert C., respectively, being named as president and clerk, and L. H. Hamel as treasurer.

Seven years later a reincorporation was effected, with $500,000 capitalization, at which time two other brothers, Walter I. and George E. Hamel, became identified with the company, while all the foremen and executives of the concern joined as stockholders, a policy which, in the intervening period has resulted in one of the most efficient and unique organizations in the leather industry.

The company's tannery is equipped with the latest improved machinery for the production of leather and important advances in the process of tanning have been brought about at the plant, patent rights being held by the concern on several machines conceived and controlled exclusively by it.

Simultaneously with the reorganization, the company announced plans for the extensive building program which will add substantially to its present floor area and plant capacity.

The expansion was made imperative by the extra volume of business flowing from its Nu-Process leather, which the Hamel Company originated and which was introduced to the trade in October, 1927. Over 30 per cent of the plant production is now of this type. It has the appearance of glazed kid and is produced at a much lower cost with the working and wearing qualities equivalent to kid.

Under the new building program the tannery will utilize 120,000 square feet of floor space, and despite this expansion the plant will continue to operate on two eight-hour shifts, and at certain seasons on three shifts. The output of skins is over 1,200 dozen daily, making the Hamel tannery one of the largest engaged in the tanning of lining leather in the entire trade.

Extra production on sheepskins of a lower grade than before has been undertaken to serve the manufacturer of low grade shoes. The company had previously produced the medium and high-grade types.

Glazed kid production has been increased about 30 per cent, and skivers, which were recently added to the Hamel line of lining leathers, have been manufactured in larger volume.

The company's sales for the first six months of 1928 showed an increase of 107 per cent over the same period of 1927, and the daily sales are now greater than the combined sales of the entire first two years of Mr. Hamel's individual activities. The concern is now represented throughout the United States and Canada, and in a number of European countries. Arthur A. Hamel is president, Louis H. Hamel, treasurer, and Herbert C. Hamel, secretary. The concern employs 400 operatives and has capital of $500,000.

THE BRADFORD HAT COMPANY

The Bradford Hat Company was established in 1902, and was incorporated in 1907, with a capital of $212,800, for the manufacture of wool felt hats.

The plant is equipped with eighteen sets of cards, 100 sewing machines, three boilers, and complete dyeing, bleaching and finishing departments.

It annually places on the market more than 1,250,000 hats of all kinds, upwards of 100,000 felt "cowboy" hats being shipped by the concern to dealers in Texas, Arizona, and Oklahoma in 1927.

H. S. Chatfield is president, J. P. Jaboki vice president, secretary and general manager, and John W. Halberton, treasurer.

Upwards of 500 operatives are employed at the local plant.

CLYDE R. SANDERS, INC.

Clyde R. Sanders, Inc., succeeded the Haverhill Wood Heel Co., on January 1, 1924, Mr. Sanders becoming president and treasurer, as well as sole owner. While the original company had enjoyed a prosperous growth and enviable reputation from 1898, when it was formed, since the reorganization production has increased 20 per cent and at times the concern has operated its plant in the Bradford district, of Haverhill, at capacity. Clyde R. Sanders is president and treasurer, and C. Howard Poor is secretary.

THE ICEMASTER COMPANY

For many years Irving L. Keith was engaged in the manufacture of shoe machinery and supplies, and becoming convinced that the day of artificial refrigerating had arrived, he devoted his energies to the development of a refrigerating machine, which a few years ago he placed upon the world market under the name of "Icemaster," and formed the Icemaster Company, of which he is treasurer and general manager.

A thorough believer in the destiny of New England and of Massachusetts, Mr. Keith views with optimism the future of the industry to which he is now devoting all his energies. He scorns the occasional note of pessimism and current propaganda designed to show that other sections of the country have a monopoly of the brains of America, and he emphasizes the independence, discipline, character, foresight and capital resources of Massachusetts industrialists who have contributed so much to make the Commonwealth the factor it is today in the manufacturing world.

The "Icemaster" is produced in a large, modern, three story and basement brick factory, in Haverhill, and Mr. Keith's inventive and executive abilities are adding to the industrial productivity of the city with whose activities he has been so long identified.

The Kimel Shoe Co. was established November 1, 1924, with forty employees by Misses Fannie E. and Etta Kimel, and has grown until today it is turning out 1,500 pairs of women's novelty McKay shoes daily, and carries 200 employees on its rolls. The Misses Kimel are still at the head of the concern.

In 1929 the Dena Shoe Co. was organized to manufacture shoes, boots, slippers, and other leather articles.

OTHER INDUSTRIES OF HAVERHILL

The Academy Shoe Co., a partnership made up of Edgar Movsesian, the Messrs. Goldberg and Marsoo Bedrosian, employs 150 operatives, in the production of women's McKay shoes.

The Advance Wood Heel Co. employs fifty operatives, in the manufacture of wood heels. Hyman Friedlender is president, J. W. Shinberg clerk, and Lewis Coltin, treasurer.

F. Archibald, Inc., with capital of $130,000, employs thirty operatives in the manufacture of cut soles and leather. Michael Flannigan is president and John J. McCaffrey secretary and treasurer.

The Charles W. Arnold & Co. Corporation employs thirty hands in the production of cut soles, and has capital of $125,000. Claude M. Arnold is president, Charles W. Arnold, Jr., treasurer, Susie M. Hall, assistant treasurer, and M. F. Arnold, clerk.

Women's turn shoes are manufactured by Ayer & MacDonald, Inc., which employs 225 operatives. L. W. MacDonald is president and S. H. Ayer, treasurer.

The Beaucage-Morris Shoe Co., a partnership made up of Frederick R. Beaucage and George E. Morris, employs fifty operatives in the manufacture of turn shoes.

One hundred employees are engaged in the plant of the Becker Shoe Co., Inc., in producing women's and misses' McKay shoes. Samuel Becker is president and Solomon Bocholtz is treasurer of the corporation.

William E. Bixby & Co., with capital of $50,000, employs twenty-five operatives in the manufacture of cut leather boards, tacks and nails, William E. Bixby being president and treasurer of the concern, and C. Howard Poor, secretary.

The Bourque Shoe Co., a partnership made up of Roy H. and Joseph C. Bourque, employs 200 operatives in the production of women's medium McKay shoes.

The Bradley Shoe Co., owned by Frank J. Bradley, employs 175 hands in the manufacture of men's and women's turn shoes.

The Brenner & Brody Shoe Co., with capital of $45,000, employs 150 operatives in the production of women's turn shoes. L. Brenner is president and John Koglouski is treasurer of the corporation.

The John Buckley Shoe Co. produces women's turn shoes, and employs seventy-five operatives, John Buckley being president and A. Finklestein treasurer.

James and John A. Busfield, as partners, operate the Charles S. Busfield Machine Co., and employ fifty hands in the manufacture of wood heel machinery.

George F. Carleton & Co., Inc., with capital of $90,000, employs upwards of 150 hands in the manufacture of slippers. It maintains a Boston office at 89 Bedford Street. Arthur L. Kimball is president and clerk, George F. Carleton, treasurer, and John E. Rines, assistant treasurer.

The Claremont Shoe Co., capitalized for $200,000, produces women's slippers, and employs 300 operatives. Israel Miller is president, George Miller vice president, and Joachim D. Rickard treasurer of the corporation.

Women's novelty McKay shoes are manufactured by the Crispin Shoe Co., which employs 150 operatives. John C. Leary is president, Edward F. Casey secretary, and Frank M. Preston, treasurer.

The A. Dalton Company is engaged in the manufacture of wooden and paper boxes for the shoe and other trades.

L. B. Dudley & Co., a partnership made up of L. B. Dudley and A. W. Walker employs 200 operatives and specializes in children's turn shoes.

C. G. Ellis, Inc., has capital of $100,000 and employs thirty-five operatives in the production of cut soles. Thomas L. Wood is president and Clifton G. Ellis is treasurer.

The A. E. Emerson Shoe Co. employs 100 hands in the manufacture of women's McKay shoes. Andrew E. Emerson is the sole owner of the concern.

The Fairfield Shoe Co., owned by C. F., H. W. and John T. Felstiner, manufactures women's McKay shoes and employs 175 operatives.

Women's shoes, slippers and pumps are produced by the Farber Shoe Co., of which Max Farber is president and treasurer.

The Felstiner Shoe Co., owned by C. F. and H. W. Felstiner, employs 100 workers in the production of women's turn shoes. The concern also operates a factory in Marlboro.

Women's McKay shoes are manufactured by the Freedman Shoe Co., owned by Morris and George Freedman, which employs 175 operatives.

The Haverhill Box Board Division of the Robert Gair Co. employs 400 operatives in the production of folding boxes, shipping cases and labels, the concern maintaining a Boston office at 38 Chauncy Street, and having its general offices at 420 Lexington Avenue, New York City. The corporation has a capital of $18,500,000.

One hundred employees are engaged in the production of medium grade women's turn and McKay shoes in the factory of the Garbelnick Shoe Co. The concern has capital of $50,000. Dr. David A. Garbelnick is president and Max Garbelnick is treasurer.

The Greenstein Shoe Co., owned by Morris and Philip Greenstein, employs 150 operatives in the manufacture of women's and children's McKay shoes.

Women's turn slippers are produced by the Groveland Shoe Co., which employs fifty operatives. J. H. Rolston is president and Charles F. Flanagan is secretary and treasurer.

The Harding Shoe Co., of which E. C. Wentworth is president, S. Harding vice president and Fred W. Mears treasurer, manufactures women's turn shoes.

Three hundred employees of the J. M. Harian Shoe Co. manufacture women's turn shoes. Joseph M. Harian and H. J. McClutchy constitute the partnership.

The Hartman Shoe Mfg. Co., with capital of $350,000, employs 500 operatives in the manufacture of women's McKay shoes, and has its Boston office at 183 Essex Street. Abraham Hartman is president and Louis Hartman is treasurer.

The Haverhill Electric Co. has capital of $2,755,100, and employs 180 operatives, in the production of electric heat, light and power, the corporation being a unit of the C. H. Tenney Co.

Upwards of 200 employees are carried on the payroll of the Haverhill Gas Light Co., which has capital of $982,800. Wallace B. Donham is president, M. L. Sperry vice president, Victor D. Vickery clerk and Henry B. Sawyer treasurer.

F. B. Heath employs 250 operatives in the manufacture of shoes.

The Herbert Holtz Shoe Co. manufactures women's McKay shoes, and

employs seventy-five operatives, the concern being owned by Herbert Holtz.

Cut soles are produced by Charles H. Horne & Co., which has its Boston office at 114 South Street. Fifty hands are employed. Charles H. Horne is president and Winfred Wildes treasurer.

Robert David and William Huston operate the Huston Shoe Co., which employs seventy-five hands in the manufacture of children's stitchdown shoes.

Women's turn shoes are produced by the Jaffarian Bros. Shoe Co., which is owned by Edward Jaffarian. Seventy-five operatives are employed by the concern.

The J. A. Jonas Shoe Co., owned by J. A. Jonas, employs 350 hands in the manufacture of women's McKay shoes.

A. E. and J. L. Karelis, as partners, operate the Karelis Shoe Co., which employs 125 operatives in the production of women's turn shoes.

The Kesslen Shoe Co. has a capital of $64,800 and employs 200 hands in the manufacture of women's McKay shoes. A. Brenner is president and H. Kesslen treasurer.

The Knights-Allen Co., of which J. H. Brown is president and J. G. Knights is treasurer, employs 150 operatives in the manufacture of shoes.

Three hundred operatives are employed by the Lennox & Briggs Co., of which Charles L. Briggs is president and treasurer. The corporation has capital of $225,000, maintains its Boston office at 104 South Street, and manufactures glazed kid leather.

Herman E. Lewis, Inc., with capital of $200,000, employs 150 operatives in the production of women's turn shoes. M. E. Frank is president, Otis J. Carlton clerk and Herman E. Lewis treasurer.

Women's shoes are manufactured by the Lexington Shoe Co., Inc., which employs 150 operatives. James K. Coucouvitis is president and Nicholas K. Coucouvitis is treasurer.

Lynn Last Co., Inc., with capital of $117,000, employs 100 operatives in the production of shoe lasts. Alfred D. Fisher is president and treasurer and B. T. Mudge assistant treasurer.

The Madian Shoe Co., Inc., employs 150 operatives in the manufacture of women's McKay shoes. Robert Becker is president and J. S. Madian is treasurer of the corporation.

Women's shoes are produced by the Marshall-Harris Shoe Co., which employs 100 operatives. Henry L. Harris is president, P. M. Heath clerk and F. W. Pettengill treasurer.

Martin & Dierauer, Inc., employs seventy-five operatives in the manufacture of women's McKay and turn shoes. Edward Dierauer is president and Oscar A. Martin is treasurer.

The Moss-Seamans Shoe Co., with capital of $200,000, employs 300 operatives in the production of women's turn and welt shoes. Vernon H. Moss is president and treasurer.

The New England Wood Heel Co. employs 100 operatives in the production of wood heels and wood heel machinery. Wesley J. Shaw is president, Ann McNamara clerk and Louis Gorevitz treasurer.

McKay shoes are manufactured by Nox-All Shoe Co., Inc., which employs 125 operatives. Arthur N. Morin is president, Benjamin Mershon vice president and Daniel J. Curtin treasurer.

Ordway & Clark, Inc., employs fifty hands in the manufacture of women's fine turn shoes. Sydney L. Curry is president and Robert B. Clark is treasurer.

The Owens Shoe Co., owned by Ernest E. Owens, employs 120 operatives in the production of women's turn shoes and men's slippers.

The Seldon Shoe Co., owned by N. H. Seldon, employs 125 hands in the manufacture of women's medium grade McKay shoes.

Two hundred operatives are employed by the Slipper City Mfg. Co. in the production of women's McKay novelty shoes. William J. Briscoe is president and Samuel Cook treasurer.

Fred A. Smith employs forty operatives in the manufacture of shoe counters.

The Star Wood Heel Co., of which H. S. Hubbell is president, Edward N. Chase secretary, H. W. Russ vice president and Halsey E. Abbey treasurer, employs 100 operatives in the production of wood heel blocks.

Edward E. Sullivan employs 100 operatives in the manufacture of women's turn shoes.

Seventy-five operatives are employed by the Superior Wood Heel Co. in the manufacture of wood hels. Edwin Kershaw is president and treasurer.

The Tessier & Bowdoin Co., owned by Albert U. Bowdoin and George W. Lawrence, employs 150 hands in the production of women's turn shoes.

The E. L. Thomas Shoe Co., owned by E. L. Thomas, manufactures women's McKay shoes, and employs 150 operatives.

The E. G. Towne Wood Heel Co., owned by Edwin G. Towne and Leslie J. Wood, employs 100 operatives in producing wood heels.

Two hundred hands are employed by the Triangle Shoe Co., of which Benjamin F. Bernstein is president and George E. Newburgh is treasurer.

The Twentieth Century Bakery, Inc., with capital of $100,000, employs upwards of 100 hands in the production of bakery goods. Clifton E. Wood is president, C. W. Gately secretary and James J. McManus treasurer.

The United Wood Heel Co. manufactures wood heels and operates a branch plant, in Salem, and employs upwards of 30 workers. Harry E. Merrill is president and treasurer, Ransom E. Pingree secretary and Lyman W. Cole, vice president.

The Wason Heel Co., owned by George M. and Earle B. Wason, manufactures wood heels and employs 125 operatives.

Women's McKay shoes are produced by the Wright-Gorevitz-McNamara Co., which employs 225 operatives. Walter C. Wright is president, Raymond V. McNamara secretary and Louis Gorevitz treasurer.

In 1929 the National Shoe Co. of Boston leased a local five-story shoe plant, and established a branch plant in Haverhill, in which 300 hands are employed in turning out 100 cases of shoes daily.

The Herrick Shoe Co. leased the A. E. Little factory the same year and is now employing 300 operatives.

ANNUAL PRODUCTS VALUED AT ALMOST $50,000,000

In 1927, Haverhill possessed 355 manufacturing establishments, which produced commodities valued at $48,736,697. Primarily engaged in shoe manufacturing, the city is one of the three large centers of the shoe industry in Massachusetts, Brockton holding first place, Lynn second, and Haverhill a close third, in 1927. Of the total value of all Haverhill products manufactured in 1927, boots and shoes produced were valued at $26,020,438, or 53.4 per cent; while boot and shoe cut stock and findings ($11,322,349) constituted 23.2 per cent.

The average number of wage earners employed in the local manufacturing industries in 1927 was 9,804; 6,647, or 67.8 per cent of whom were employed in the manufacture of boots and shoes, and 1,513, or 15.4 per cent, were employed in the manufacture of boot and shoe cut stock and findings. Of the total amount, $11,870,640, paid to wage earners employed in all local manufacturing establishments in 1927, those employed in the manufacture of boots and shoes received $8,009,523, or 67.4 per cent, and those employed in the manufacture of boot and shoe cut stock and findings received $1,946,787, or 16.4 per cent.

In four months of 1928 there were shipped from Haverhill 199,613 cases of shoes, each averaging thirty-six pairs, or a total of 14,372,136 shoes.

The October, 1928, local output was 55,036 cases, or approximately 16 per cent, or one-sixth of all the women's shoes made in the United States that month, according to the figures of the United States Department of Commerce. This monthly total was the largest single month's production Haverhill had experienced since 1923.

A fairly good index of the record of local business is the amount received in postal receipts. In 1900 the annual receipts of the Haverhill post office were $50,000 per annum. By 1905 they had increased to $67,058, and by 1910 to $95,569. In 1915 they rose to $130,324, while in 1920 they stood at $178,591, and in 1927 they reached $218,760, having increased $168,000 in a little more than a quarter of a century.

CHAPTER XIX

SALEM'S TRANSFORMATION

FROM CLIPPER SHIPS THAT CARRIED THE FLAG TO EVERY KNOWN PORT, TO WORLD FAMOUS SHEETINGS

Six years after the Pilgrims landed at Plymouth, Roger Conant and his companions settled on "the pleasant and fruitful neck of land called Naumkeag," and in a secluded cove admirably situated and protected from the northerly and easterly winds by an elevated point of land projecting into North River, their houses of temporary construction were raised.

To the Rev. Hugh Peter, a non-conformist clergyman, Salem owes its original influence in commerce and industry, and, following the impetus he gave to business, the wharves which soon sprung up were lined with ships built by Salem merchants, manned by her sons, and sent to every market of the world. Soon her wharves were piled high with rich products of every civilized and barbaric land. There were eastern ports where the names of New York, Philadelphia and Baltimore were scarcely known, but where Salem, of such small stature among her sister cities, was supposed to be the great commercial emporium of the West. In 1825 there were 198 vessels flying Salem signals, and Salem ships were the first to display the American flag in many foreign ports, and to open trade with St. Petersburg, Zanzibar, Sumatra, Calcutta, Bombay, Batavia, Arabia, Madagascar and Australia. Today nobody in Salem makes a living by bringing gum-copal, or silks, or ivory, or spices, or dates, or coffee from the Orient, and the merchant no longer waits in his counting-room, spyglass in hand to see his ships come up the bay.

In the earlier days, Derby Street, the great commercial thoroughfare of the town, was alive with the bustle of business. Vessels crowded at the wharves, bringing their cargoes of silk from India, tea from China, pepper from Sumatra, coffee from Arabia, spices from Batavia, gum-copal from Zanzibar, and hides from Africa, while others were being laden with American goods for the foreign trade. At every lounging place on every street corner, and about the doors of the numerous sailor boarding houses were seamen fresh from Eastern countries, and others about to sail thither, having all the peculiarities of the true rover of the seas. The shops and stores were full of strange and unique articles, brought from distant lands. Parrots screamed and monkeys and other small animals from foreign forests gamboled at will in the back shops. Suggestions of foreign lands met the vision at every turn. Many of the curiosities and oriental objects now preserved in the Peabody Museum were brought home on these voyages. The ship *America* brought from Bengal to Salem in 1796 the first elephant that was ever seen in the United States.

THE CHANGING TIDE OF INDUSTRIAL PRODUCTION

The story of the industry in Salem is not unlike that of many another manufacturing city of New England, for, as we turn the pages of the past, we find that fifty years ago, in 1880, when the census of manufacturers

was taken, it revealed the value of all products fabricated in the Witch City that year to be but $8,440,350, of which leather manufacture represented nearly one-half. The remaining thirty-one lines of local industry then existent provided the difference.

And yet we hear the oft-repeated fabrication that Salem saw its heyday in the era of the sailing ship, when her merchant princes controlled the trade of the seven seas and when the city was considered by thousands of persons in foreign lands, where her argosies filled their hulls with countless tons of tea, pepper, and the products of every known port, as constituting all of the United States.

These untutored critics forget that the value of a single year's product of one of Salem's major industries—the Naumkeag Steam Cotton Company—amounts to more than twice the value of all the industrial products of the city fifty years ago, while that of her more than 120 manufacturing units approaches $30,000,000 annually.

Salem is but typical of all our Massachusetts industrial centers in their ability to adjust themselves to changing manufacturing conditions. Her earliest adventures in industrial production were centered in the leather trade, which demonstrated a slow but steady growth, with but few periods of retrogression. Her first recorded tanner was Philemon Dickinson, who flourished in 1639. Her ancient tanneries probably existed on the land now bordering the northerly side of Washington Square and Forrester Street, for, in 1886, when excavating for a residence, the rotted boards of vats were unearthed, accompanied by tan bark in various stages of decay. Similar substances were also found at the foot of Liberty Street, thus indicating that here, too, in earlier times tanners had plied their trade. John Hobart, of Nottingham, who settled at Salem, in 1635, was the town's first shoemaker.

In 1639 Salem started the manufacture of glass, the promoters being Ananias Concklin, Obadiah Holmes and Lemuel Southwick. The following year John Concklin also became a glass producer, and in 1645 the General Court gave permission to a new company to start glass manufacturing. Bottles probably constituted the principal product.

In 1642 leather searchers provided for in conformity with an act of the General Court were appointed in Salem. This act, passed June 14 of that year, was the first law to regulate the manufacture of leather in Massachusetts and its enactment indicates that it was then an established industry.

By 1768 four tanneries were in existence in Salem, and just prior to this date, Joseph Southwick, a preacher-tanner of Danvers, introduced the first recorded improvement in the process by using his horse to supply the power to grind the bark in a stone mill. There is a wide difference between the efficacy of his process which ground one slab of bark in half an hour and the improved machinery of today, whose capacious maws care for a carload in less than that period of time.

About 1789 a sail cloth factory was established in Salem and became a flourishing concern.

The Salem Iron Mfg. Co. was incorporated in 1800, with capital of $330,000.

In 1813 that great shipping and merchant genius, Elias Hasket Derby, erected a broadcloth mill at Salem. Two years before he had shipped from Lisbon a flock of 1,100 merino sheep, two-thirds of which lived out the voyage, and were placed on his Ten Hills Farm in Boston.

Benjamin Porter was granted a patent on May 18, 1814, on a brick

press—the first recorded of its kind. In 1821 the manufacture of alum was begun in the town. Sulphate of copper (blue vitriol) was also produced locally about the same time.

At the opening of the nineteenth century Salem had seven tanneries and fifty years later (1850) she possessed thirty-four, with 550 hands employed, or an average of sixteen men each. Even as late as 1880, there were fifty-two establishments, but only 910 men employed therein, or an average of seventeen each.

That year the value of the tannery products was $4,209,404. Today, the annual value of her tanneries approximates $7,000,000, and combined with the local boot and shoe factories, other than rubber, and the boot and shoe cut stock and findings plants, the entire group in these three divisions, numbering upwards of fifty separate establishments, produce each year commodities having a value of approximately $12,000,000, or almost one-half of the total of all goods manufactured in the city.

In these three types of industry there are employed between 2,000 and 2,500 workers, who are paid between $2,500,000 and $3,000,000 in wages each year.

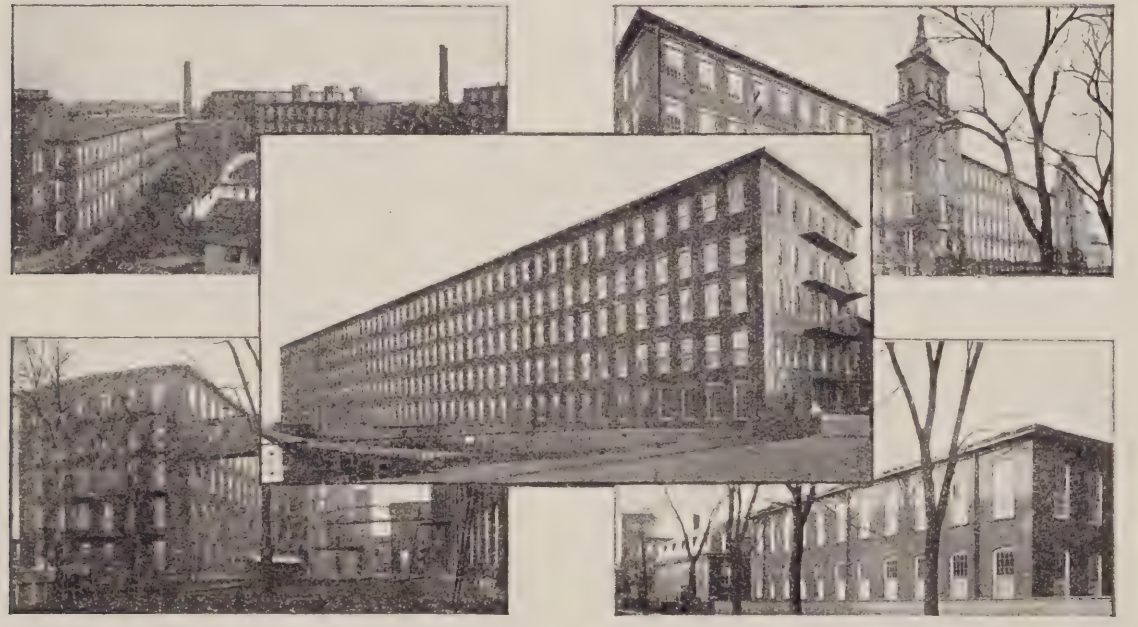
Fifty years ago Salem's fame as an industrial center was due quite as much to the Adamanta Works, capitalized at $350,000, engaged in the manufacture of paints prepared by what was then a new process; to the production of typewriters, under the Hall patents; to the manufacture of horse cars by the Salem Car Co., which came into being in 1863; to the Atlantic Car Co., producers of railroad cars, and to the Salem Laboratory Co., dealing in chemicals, as to the achievements of any other manufacturing concern then in operation in the city. Yet today not one of these concerns is existent. Their inception, history, officers, and products are almost forgotten factors in the annals of Salem, but in their place, there have risen, Phoenix-like from their ashes, many outstanding concerns, whose position in the industrial world is evidence that the critic is not justified in pointing to the demise or removal from Salem of even a large manufacturing concern as being indicative of industrial decay.

THE BIRTH OF THE NAUMKEAG STEAM COTTON CO.

Previous to 1839 Salem was one of the greatest seaports of the country, but her merchants, who had built up wealth in sea trade had the choice of moving to Boston or retiring from business. Accordingly, a group of retired ship owners and ship masters decided to use their capital in manufacture, and agreed to try cotton weaving.

There was no water power, a situation which all textile plants up to that time had considered essential for the establishment of mills. Power in the form of steam from coal was resorted to, while proximity to the ocean gave the site the proper moisture. The company was named after its then unusual power source, Naumkeag Steam Cotton Company. This was the first break from watercourses and waterfalls, in Massachusetts, or elsewhere for that matter. The mill was in successful operation as early as 1845.

At the outset, sheetings, twills and a variety of other fabrics were manufactured. Diverse business required continual expensive readjustments in the factory. To keep ahead of style, changes had to be constantly made in the machinery. Just when the new equipment had been paid for the style would change again. Looms were operated for the manufacture of many fabrics, for in those days the loom was supposed to be a jack-of-



MILLS OF THE OLD NAUMKEAG STEAM COTTON COMPANY TOTALLY
DESTROYED IN THE GREAT SALEM FIRE OF JUNE, 1914

all-trades. Maximum efficiency was not obtained from the looms on any one fabric.

Soon after 1890 the plant gradually concentrated on sheeting and pillow cases. The percentage of sheeting to the entire production has increased from 25 per cent in 1890 to 92 per cent at present. Meanwhile, the total production more than doubled, and 18,000,000 pounds of finished sheeting are turned out annually, in the new mills.

The great conflagration which all but wiped out the plant began in the early afternoon of June 25, 1914, as a result of an explosion of chemicals in a leather factory. It was thirteen hours later before the flames were under control, and about 1,800 buildings, 1,600 of which were dwellings, and 41 factories had been destroyed. Fifteen thousand people were rendered homeless, while the property loss was set at $14,000,000. Fortunately but three lives were lost and the flames did not consume a single historic spot in the city.

Only one of the twenty-buildings of the Naumkeag plant was left; this was the reenforced concrete structure erected in 1906. There was on order a considerable number of looms for another recently built structure. However, these looms had not yet arrived and were not consumed. Into the one remaining building went the entire shipment when the looms reached Salem.

The yarn-making processes had been completely wiped out, so it became necessary for the time being, to purchase the required amount of yarn to keep the new looms busy. The manufacture of variety goods was suspended during this emergency, and nothing but sheeting was produced. About 70 per cent of the market was kept supplied in this manner during the eighteen months' period of rebuilding. At no one time was the name of the company lost to the market. Production went along as before, in so far as the actual weaving was concerned, although slightly under the quantity demanded. The heads of various departments, which had not been started up, as well as expert workers were kept employed to the end that an intact organization and continuing business might move into the new buildings as soon as they were finished.

New mills meant new machinery and equipment. New looms and other mechanism purchased were fitted to produce the sheeting specialty, and costs were cut enough to pay for the fire in a comparatively short time.

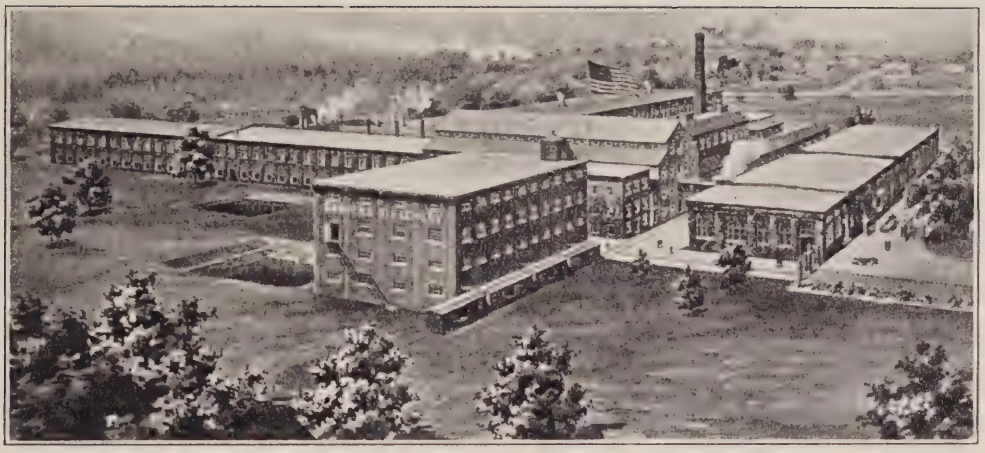
The new buildings are all of reenforced concrete with the greatest possible window spaces consistent with this material, and today, sixteen years after their erection, are considered by mill engineers, as representing the best example of cotton mill construction and equipment in this country, or Europe.

INCREASING EFFICIENCY IN PRODUCTION

In the old plant before the fire there were several card rooms, several spinning rooms, and several weave rooms. There was constant confusion in bringing the product of the various departments to the right room. In the new plant the twenty odd buildings were reduced to four large structures. All the spinning rooms are in the same building. Spinning for the warp is on one floor, and spinning for the woof on another.

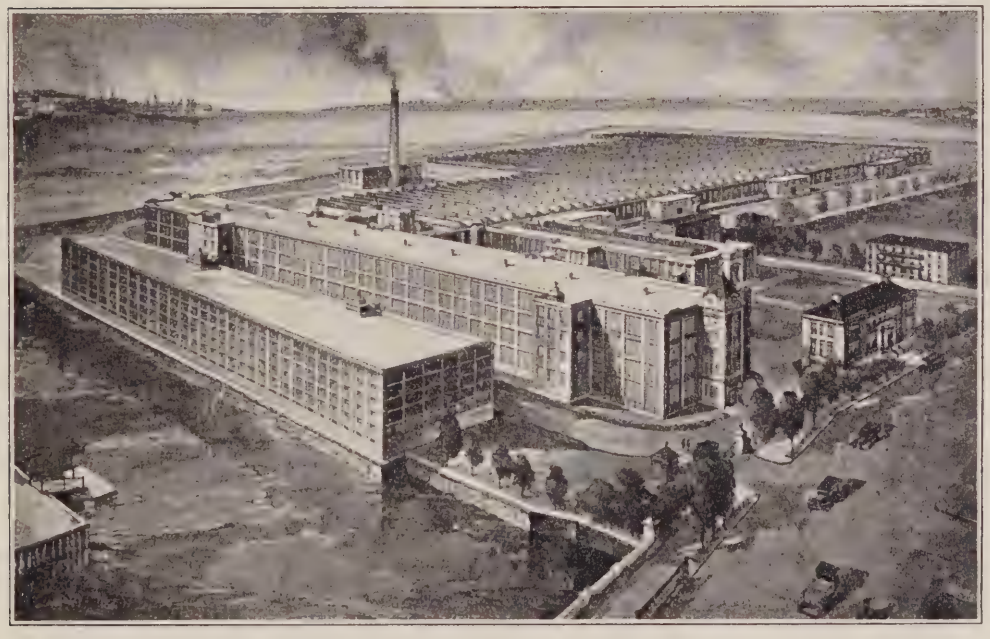
The entire weaving is concentrated into one spacious room, 625 feet by 420 feet, with a wing 580 feet by 212 feet, and a later addition 144 by 474 feet, comprising nine acres—the largest weave shed in the world.

Construction is of the one-story and basement type with saw-tooth roof opening to a north light.



DANVERS BLEACHERY AND DYE WORKS, PEABODY

Owned and operated by the Naumkeag Steam Cotton Company, for bleaching, finishing and hemming Pequot sheets and pillow cases



NAUMKEAG STEAM COTTON COMPANY, SALEM, 1928

This nine acre weave shed is devoted to nothing but Pequot sheeting, and there are 4,047 looms busy on one fabric, each being wide enough to make an entire sheet without a seam down the middle.

In the spinning building 163,312 spindles produce the yarn to be woven into sheeting, this structure being one of the largest individual spinning units in the world. In one room on the third floor alone, there are 98,000 spindles.

At the Danvers Bleachery, in Peabody, a subsidiary of the Naumkeag concern, 700 hands are employed, and in 1927 a big addition was made to that plant, which has a capacity of bleaching 200 tons per week.

When the founders of the Naumkeag Steam Cotton Co. received their charter, on April 5, 1839, with a capitalization of $200,000 they little dreamed that in less than ninety years later this modest producer of cotton sheetings would rank as one of the two or three largest manufacturing units of its kind in the entire world.

An investment of $1,050 in seven shares of the common stock of the company, even as late as 1900, would have yielded between that year and 1927, no less than $1,897 in cash dividends, as well as a stock dividend of 100 per cent in 1923, thus giving the owner of these shares fourteen instead of the original seven he bought.

Based upon the approximate price of shares on January 1, 1927, the total appreciation in the interim would have been $1,358, and the combined value of the investment, including cash and stock dividends would amount to $4,305, the average return to shareholders over a period of twenty-six years, from 1900, to 1926, inclusive, being $19 per share.

The record of financial operations of this company is all the more remarkable when one considers that since 1912 it has increased its surplus account up to 1927 by $3,163,437, while it reduced this item by the declaration of a 100 per cent stock dividend, and this in spite of the fact that in 1914 it suffered the complete loss of its plant in the disastrous Salem fire. But it rose from the ashes with one of the most up-to-date textile plants in America, a factory built upon a gigantic scale, and one which, between 1919 and 1925 increased its yearly yardage production by 6,418,410 yards.

The plant manufactured in the fiscal year, which ended December 3, 1927, a little less than 20,000,000 pounds of cotton cloth, or nearly 32,400,000 yards of an average width of approximately seventy-two inches—this enormous production consisting almost entirely of the well-known Pequot sheeting.

The concern is capitalized at $6,000,000 and employs 1,600 operatives. J. Foster Smith is agent, Henry P. Benson, president, and Ernest N. Hood, treasurer of the corporation.

PARKER BROS.—THE GREAT PRODUCERS OF GAMES

Intimately as one may know his Massachusetts, it will surprise many citizens to learn that the game headquarters of the world are locattd in Salem, even as the toy center of the universe is in Winchendon. The plant of Parker Brothers, where famous games have been manufactured for two generations, houses one of America's most interesting and unique industries. Founded forty-two years ago by George S. Parker, now president of the company, the steady growth of the concern has been due to his genius in devising novel games, such as Ping-Pong, a game of great nation-wide popularity; Rook, the largest selling home game in the world; Pit, the hilarious fun maker; Touring, the outstanding game success of 1926 and 1927; and Hokum, the big success of 1927. Many hundreds of

different games are included in the Parker line, which is nationally advertised, and sold throughout the civilized world, being played in Australia, at the equator, and even by the Eskimos near the north pole.

Today, an active development division under the direction of F. L. Ordway, coöperates with Mr. Parker in designing new games to satisfy America's insatiable thirst for novel amusements. Every game is designed first to "play well," and before being approved must pass a rigid test in actual play by an experienced committee. Many a boy and girl has learned geography, natural history, Bible lore, or housekeeping, and has trained eye and hand disposition, while enjoying the fun and hilarity of playing a Parker game.

The corporation is capitalized for $500,000 and employs upwards of 150 operatives. George S. Parker is president, Charles H. Parker, vice president, and Howard C. Turner, treasurer and secretary.

THE HYGRADE LAMP CO.—ANOTHER TWENTIETH CENTURY ENTERPRISE

Five times during the last twelve years, President E. J. Poor, Treasurer F. A. Poor, and Secretary W. E. Poor, of the Hygrade Lamp Company, capitalized for $2,390,400 have reached out of New England, absorbed five going concerns, and brought into the Salem plant, the added facilities of these units.

Two of these acquisitions were made in 1928—the purchase of the Triumph Lamp Company, of Indianapolis, Ind., effected in January, by which the manufacture of 2,000,000 electric incandescent lamps formerly made annually in the Middle West was brought to Salem, and the acquirement in September, of that year, of the business of the Vosburgh Miniature Lamp Company, of Orange, N. J., by which 5,000,000 miniature automobile lamps formerly made in New Jersey, are now manufactured by the Hygrade concern, in Salem, thus bringing its output up to 17,000,000 incandescent lights a year, and further consolidating the company's position as the largest independent licensed manufacture of bulbs or lamps in the United States. It is the only concern in New England making the miniature auto lamps.

These purchases and transfers of business to Salem, constitute just another bit of evidence that Massachusetts ability, grit and determination, can not only manufacture a finished product of high standard, but can also create, secure and hold business in competition with concerns located in other parts of the country.

Here is an enterprise, less than thirty years old, that now employs over 500 operatives and produces upwards of 50,000 lamps a day, which it markets through 200 jobbers, and more than 5,000 dealers, besides supplying some of the largest industrial and public utility corporations with their total requirements. It also operates a subsidiary, the Neptron Corporation, which manufactures radio tubes.

Its progressive executives are committed to the policies of simplified lines, standardized quality and standardized prices, and its entire output is marketed under its own Hygrade brand.

Further proof that the corporation is in line with the progressive spirit of the times and intends to grow with Massachusetts, is shown by the fact that it backs up its selling and manufacturing activities with a large engineering department, which is constantly on the alert, not only to keep the product at its very high standard, but even more to prepare for future developments.

The company was incorporated under the laws of Massachusetts in

1917, to succeed to the lamp business established by Frank A. Poor, in 1901. It is licensed to make and sell incandescent electric lamps under the patents of the General Electric Company. The company is now the third largest manufacturer of large lamps and the fourth largest manufacturer of automobile lamps in the United States.

Edward J. Poor is president, Frank A. Poor treasurer, Walter E. Poor vice president and John S. Learoyd, clerk.

Nearly forty-five years ago the Bay State Belting Company was organized, and, in 1884, was incorporated, and soon after purchased a factory in the Blubber Hollow district of the city. In 1911, its capacity was increased by the erection of a beam house, power plant, and three story building, all of brick. The various types of leather produced at the Salem plant are shipped to the Boston factory, where they are finished, and a branch plant is maintained at Providence, R. I.

The concern has capital of $300,000, employs 125 operatives and is managed by Francis P. Blake, president, E. J. Manchester, secretary and Charles S. Frary, treasurer.

Fortunate indeed is Salem, in her power resources. The city is served by the Salem Electric Lighting Company, capitalized for $2,583,050, employing 170 operatives, in producing light, power and heat for industrial and other purposes, the local unit being a part of the Tenney power interests.

In 1929, following an exhaustive analysis of the situation, Charles H. Tenney & Co. determined to erect a large super power plant on the site of the terminal wharf, at tide water, and entered upon large expenditures in developing the channel and piers in preparation for building an electrical generating station, the initial installation being of 100,000 kilowatt capacity, but the plans call for a plant having an ultimate production of from 400,000 to 500,000 kilowatts, as conditions demand.

SOME OF SALEM'S OTHER PROMINENT INDUSTRIES

The Henry K. Barnes Company, with capital of $95,000, and employing fifty operatives manufactures leather belting at its Salem plant, and maintains its Boston office at 234 Devonshire Street. Arthur D. Hitchings is president, Walter M. Ray vice president and secretary, and E. Harry Landberg treasurer of the corporation.

Two hundred operatives are employed by the Pitman & Brown Co., of which George W. Pitman is president, Wallace F. Williams, vice president, and Charles C. Tuttle, clerk, the concern being engaged in the production of building finish, factory supplies and equipment.

The Russell-Sim Tanning Company, with capital of $40,000, Henry L. Russell president, and Chester B. Sim, treasurer, is one of the leading leather producing units, of the city.

The Salem Elevator Works, Inc., employ fifty operatives in the manufacture of passenger and freight elevators, Lewis F. Allen, being president, S. Duke, secretary and Harry Duke, treasurer, of the corporation.

The Salem Laundry Company is the largest unit of its kind in Essex County, employing 175 operatives. G. W. Hooper is president and secretary, and Lucien Pierce, treasurer. The corporation has capital of $300,000.

The Salem Oil & Grease Co., with capital of $100,000, manufactures tanners' oils and greases. H. T. N. Smith is president, H. W. Pierce, secretary and M. S. Smith, treasurer, of the concern.

Robert J., Francis D., and Peter A. Sim, operating under the firm name

of Peter Sim & Sons, employ upwards of 100 operatives, in the tanning of sheep leather. The concern was founded by Peter Sim, in 1873.

The Wilkinson Counter Company employs 100 operatives in the production of shoe counters and innersoles, Ray L. Wilkinson being president, William F. Wilkinson, treasurer, and G. C. Bresnahan, secretary of the corporation, which has capital of $50,000.

The Atwood & Morrill Co., of which H. B. Morrill is president, C. P. Atwood, secretary and B. T. Atwood, treasurer, employs fifty in the manufacture of valves and steam specialties.

The Dinsmore Mfg. Co., Inc., A. L. Curwen, president, B. H. Curwen, secretary and Lewis F. Allen, treasurer, manufactures textile sewing machines.

The Aulson Tanning Machinery Co., with capital of $300,000, produces hide and leather working machinery, P. G. Aulson being president and E. R. Aulson, vice president and treasurer.

J. Brown, Jr., George A. Brown and Edward T. Brown, forming the partnership of J. Brown & Sons, employ 650 operatives, in the manufacture of women's and children's shoes, the concern ranking as one of the largest employers of labor in the city.

The Brown-Perkins Shoe Co., with capital of $50,000, employs 100 operatives, in the production of women's McKay shoes, Lyman G. Perkins being president, John J. Leonard, secretary and Jesse P. Brown, treasurer.

Cook Bros. Leather Company, Inc., capitalized for $75,000, manufactures calf leather, and employs seventy-five operatives, Charles A. Cook being president, Walter F. Barton, secretary and Edward Cook, Sr., treasurer.

John Flynn & Sons Company, of which John Flynn is president and treasurer, capitalized at $100,000, is engaged in the production of sheepskin leather, and employs 60 operatives.

The Goodell Zina Corporation, with capital of $125,000, employs 100 operatives, in the production of special tools, locks, and indicators, F. L. Wall being president, R. W. Hill, secretary and William Kingston, treasurer.

W. P., and E. F. Harmon, copartners, doing business as W. P. & E. F. Harmon, employ fifty operatives in tanning upper leather.

Helburn-Thompson Company, Inc., with capital of $1,100,000, is engaged in the production of goat and sheep skins, and employs 200 operatives, being one of the large North Shore tanners. Alvah P. Thompson is president, Henry W. Stone, vice president, J. Willard Helburn, treasurer and Harris S. Knight, assistant treasurer of the corporation.

The India Leather Company, owned by William J., and Frank J. Ronan, partners, employs fifty operatives in the manufacture of sheep and goat leathers.

William A. Irving is president and treasurer and James S. Irving, vice president, of the Irving Box Company, capitalized for $70,000 and employing fifty in the production of wood and paper boxes.

The Lafayette Shoe Company employs seventy-five operatives in the manufacture of women's McKay shoes, H. M. Gilbert being president, and James F. Crowley, treasurer, of the corporation.

One of the large tanneries of the city is that of Leviseur, Haroth & Co., Inc., which employs 200 operatives, in the tanning of leather of various kinds, Frederick T. Leviseur being president, William J. Ahern, vice president, and Alfred W. Haroth, treasurer, of the concern.

The Locke Regulator Company, with capital of $90,000, S. Locke

Archer, president, and A. G. Locke, treasurer, manufactures steam specialties.

N. C. Lyon & Co., a partnership made up of Messrs. N. C. Lyon and Gregory O. Lyon, with capital of $500,000, is another of the leather tanning units of the city.

The McGrath-O'Donnell Shoe Company employs seventy-five operatives in the manufacture of shoes, John J. McGrath being president, and Eugene A. O'Donnell, treasurer, of the concern.

Marrs Bros. Leather Company, owned by William H., and John J. Marrs, employs 150 operatives, in the tanning of calf and side leathers.

The Michaud Shoe Company, owned by J. Eugene Michaud, employs fifty operatives, in the production of misses' and children's McKay shoes.

The Arthur J. Mulholland Company, of which Arthur J. Mulholland is president and treasurer, employs 250 hands, in tanning sheep and goat upper leather, the corporation being capitalized for $50,000, and Thomas A. O'Keefe, owner of the Thos. A. O'Keefe Company, employs seventy-five operatives in tanning sheep leather.

The Park Leather Company, with capital of $150,000, employs upwards of 100 operatives, in tanning sheep and fancy leathers, Louis M. Musliner being president, H. H. Lee and Maurice Wineapple, vice presidents, Charles Wineapple, treasurer, and Joseph Wineapple, assistant treasurer and secretary.

The Ryan-Roger Shoe Company manufactures women's McKay and welt shoes, employs 100 operatives, and is managed by J. A. Ryan, president and H. W. Stevens, treasurer and secretary.

The Salem Gas Light Company, with capital of $1,133,825, employs 125 operatives, in the production of gas and coke. D. E. Mason is the president and E. A. Bradley treasurer.

The Salem Tanning Company, owned by N. J. Reilly, employs fifty operatives in the production of calfskin splits.

The Donn D. Sargent Company, Inc., successor to Sargent-Anderson Company, Inc., with capital of $100,000, is one of the city's larger shoe producers, employing 250 operatives in the manufacture of women's McKay footwear, the capacity being 1,500 pairs daily. Donn D. Sargent is president and treasurer of the corporation.

The Stanley Turn Shoe Company, owned by William T. Stanley has a capacity of 1,000 pairs daily, of infants and misses' turn shoes.

The Tidewater Leather Company, owned by I. W. Skilton, employs 100 operatives in the manufacture of patent leather.

The United Wood Heel Company, of Haverhill, operates a branch plant at Salem, and Vaughan Bros., owned by Gordon C. and George C. Vaughan, Jr., employ 150 in the manufacture of misses' and children's stitchdown shoes.

In 1929, the S. L. Agoos Tanning Company purchased land and a factory, in Salem, and began the manufacture of calf-leather. S. L. Agoos is president and treasurer, N. D. Nexon vice president and Patrick J. Dee, secretary.

The Frank Coombs Shoe Co. recently opened a new and modern plant where the Frank Coombs Littleway shoes for women are produced by the new Littleway process of lasting the upper to the insole, and in the course of which the upper is wire-stapled instead of being tacked to the insole.

Twenty-one years ago Frank Coombs secured a position in a North

Shore shoe factory, where he worked at the bench, studied, and identified himself with men who knew good shoes and who produced them.

A. E. Little, then the greatest shoe manufacturer of Essex County, was working on an invention at that period. "Some day," said Mr. Little to Mr. Coombs, "I hope to see you making shoes in your own plant and using my process—the Littleway"—a dream that has now come true.

Mr. Coombs has brought together in his model factory at Salem a group of master shoe makers, designers and merchandisers.

Salem has a number of small concerns that are engaged in the production of shoes, leather, and other lines collateral to footwear.

Those who make careless statements to the effect that industry is declining in Massachusetts will find but little solace, and absolutely no justification, for their assertions in the figures applying to Salem, as in 1927, the manufacturing establishments of the Witch City possessed invested capital amounting to $22,218,176, used stock and raw materials, valued at $14,223,979.

They paid wages amounting to $6,293,605, or $315,969 more than in 1926, and a million and a quarter in excess of what they paid in 1921.

The average number of wage earners employed in Salem in 1927 was 4,986 or 107 more than in 1926, and the value of the products—$30,165,624—was increased over the 1926 figures, by $2,201,053.

CHAPTER XX

GLOUCESTER

PURVEYOR OF SEA FOOD TO THE WORLD

When Essex County emerged from the War of 1812, which proved the most awful ordeal through which that section has passed since its settlement three centuries ago, and had hurdled the Federal embargo and British blockades that combined to throttle the life of North Shore shipping—then the principal industry of that part of the state—her harassed merchants ineffectually tried to revive their foreign commerce, but they found it a losing struggle. Slowly but surely Boston was absorbing the ships that formerly hailed from Salem, Beverly, Newburyport, Marblehead, and the other North Shore ports. Gloucester turned to fishing and remains on the sea to this day, but most of the others gave up the struggle and invested their profits in manufacturing enterprises. Only Salem refused to quit. Her merchant princes clung to the Sumatra pepper trade, despatched their vessels to Madagascar, Zanzibar, the West Coast of Africa, the South Sea Islands and to South America, never admitting their defeat until 1893, when Salem, and nearby North Shore towns, definitely turned from the briny waves of the sea to the fresh water of the Merrimac River, which had become harnessed for power purposes.

The manufacture of glue was begun in that part of Gloucester, now embraced within the territorial limits of Rockport, in 1824, being produced from cod, the product being mainly used at that time by cotton manufacturers. For many years thereafter Gloucester was the sole seat of this business in the United States.

Just about 100 years ago a quarry began operations at Gloucester, but the Cape Ann Granite Company was not incorporated until 1869, with capital of $100,000, while the Lanesville Granite Company came into being in 1873, with capital of $50,000.

THE GORTON-PEW FISHERIES COMPANY, LTD.

Today Gloucester is still preeminent in her ancient codfish industry and holds her place, after more than 300 years, as the chief fishing port of the United States. It is estimated that approximately $250,000,000 worth of fish have been caught during the past fifty years by Gloucester fisheries.

The history of the Gorton-Pew Fisheries Company, Ltd., may be said to go back to the first days of Gloucester, for there is little question that ancestors of present officers of the company were among those settlers in 1623. Their descendants have been engaged in the fishing business directly or indirectly ever since.

Early in the nineteenth century the great-grandfather of one of the present directors of the company came from Virginia to engage in the fisheries. Incidentally, this man, though he served with Washington's army, lived to the ripe old age of 107 years, a living testimony to the theory that a fish diet produces health and longevity.









GORTON-PEW FISHERIES COMPANY, GLOUCESTER

The present organization dates definitely from 1849.

At the age of eighteen years, Nathaniel L. Gorton began as a salesman of Gorton's codfish, and within a few short years, after studying and analyzing the field of distribution and the needs of the business as he saw them, he urged the concern to intensively advertise boneless codfish, the sale of which soon reached unheard of proportions. Admitted to the firm of Slade, Gorton & Co., young Gorton saw that economies could be effected by bringing about a merger of that unit with John Pew & Co., David B. Smith & Co., and Reed & Gammage, and the Gorton-Pew Fisheries Company was formed.

Today, besides owning and operating its huge fleet of fishing vessels, the company has available the catch of many other Gloucester vessels. It owns and operates a large series of plants for curing, preparing and packing fish, but with all its growth, the factories maintain much of the old time picturesqueness that is a part of Gloucester.

In 1928, the Gorton-Pew concern purchased the adjoining plant of the William H. Jordan Company, formerly one of the largest enterprises in the city.

The schooner *Esperanto,* built by the company primarily for mackerel fishing, was used for all branches of the fisheries business, including codfishing off the Banks, and when, in 1920, citizens of Halifax, Nova Scotia, challenged citizens of Gloucester to an international race of fishing vessels, the *Esperanto,* just in from a long fishing trip, was the only Gloucester ship available. She was entered in the event without special preparation and, after one of the most thrilling sea races ever sailed, won the international cup and prize money. The following year the *Esperanto* was lost at sea, after striking a submerged wreck. Thomas J. Carroll is president, George Putnam, treasurer, and J. William Darcy, secretary, and the corporation employs 500 hands.

GEORGE W. SMITH BEGAN THE ELIMINATION OF WASTE IN THE EARLY SEVENTIES

No history of industrial Gloucester would be complete that failed to take cognizance of the contribution made to the elimination of waste by George W. Smith, a Civil War veteran, who in the early '70s evolved a scheme to utilize broken codfish, which he purchased at a price along the water front, divested them of their skins—the first time the process had been commercially practiced at the port—and packed the section in cardboard boxes which he peddled to his up-state customers.

Unconsciously he revolutionized the salted fish industry, with the result that within two years after he began his experiment all the Gloucester dealers had added skinning lofts to their plants, and were offering boneless cod in boxes to the trade. But there was a backfire to the change in methods. Small mountains of codfish skins accumulated in the sheds, and the disposal of these became a problem. Some were hauled to nearby farms, to be employed as fertilizer. Isaac Stanwood, having occasion to cross a field, following a prolonged wet spell which was succeeded by one of excessive heat, picked up one of these sun-cooked skins and found that it clung to his flesh. He told of his discovery of glue in the parched codfish skin, and an ambitious young man employed in making tin cans in a local factory attempted to capitalize the refuse, but as the glue decomposed, his shipments were returned. He promptly sought a Boston chemist, who recommended a preservative formula of carbolic and boracic

acids, perfumed with checkerberry, and the commercial success of his experiment was effected. Soon the demand for codfish skins advanced to $20 a ton, and they now stand at $90 a ton.

Next came the use of these skins for tanning purposes, and the utilization of the product in cigarette cases, bill folds and all sorts of souvenirs, the demand being so great as to make it necessary today to draw on the codfish centers of Norway for tanned skins to supply the souvenir manufacturers with the raw material. Literally George W. Smith made many blades of grass grow where but one grew before.

SELLING FISH BY MAIL ORIGINATED IN GLOUCESTER

When a Gloucester man conceived the idea some years ago of selling fish by mail the plan was regarded as chimerical, but it represented merely the steady growth and development of a policy which Frank E. Davis, of the Cape Ann city, had carried out in the cabin of his father's vessel, when, as a boy, he learned how to clean and cure fish in such a way that they would keep indefinitely. Returning to port one day, young Davis despatched a pail of salted mackerel to some inland friends, and the letter of thanks suggested to him the feasibility of sending seafood to the interior; and from the initial circular he prepared grew a business which, today, supplies some 200,000 families whose homes are scattered throughout all parts of the country, with carefully selected, and packed fish. In the beginning Davis and his wife were able to care for the orders, but long since the little wooden building on the wharves of Gloucester where the earlier distribution was made has given way to a large, modern structure where up-to-date sanitary and culinary methods are employed. Today, the Frank E. Davis Fish Company furnishes employment to 100 men and women. The corporation has capital of $400,000. Frank E. Davis is president and Arthur C. Davis, treasurer and secretary.

The city, which from the beginnings of American industry has been the center of deep sea fishing ventures, is the leading fishing port of America, and no small part of its twentieth century prestige is due to the development of the plan of the selling of sea food by mail.

Within four years the General Sea Foods Company, of Gloucester, has taken over 40,000 square feet of floor space in the city, following several years of experimentation, research and machinery development based upon recommendations of the United States Department of Fisheries, and is revolutionizing the hitherto prevailing practice of supplying the interior of the country with fresh fish which will arrive at its destination in perfect condition.

The methods employed comprehend the use of only fresh fish, greater care being exercised in treating the catch on board the vessels; the employment of automatic machinery in the plant, which reduces the possibility of contamination; the utilization of the rapid freeze method, where a temperature of 45 degrees below zero is attained, which insures the product reaching the market while still in a frozen state, thus enabling it to retain its superior flavor, and packing only the fillets of solid meat, the catch being scaled, cleaned, dressed and boned before being packed and sealed in sanitary containers surrounded by heavily insulated cartons. A bacteriologist tests for purity and taste in a specially equipped laboratory all the product before shipment. The concern expended more than $125,000 on equipment, in addition to a large sum on research and machinery design, before it placed its products on the market, and employ-

ing the most modern methods of distribution, its success has been phenomenal even in the short period its product has been on sale.

The corporation has capital of $3,000,000 preferred and 30,000 shares of no par common, and employs 100 hands. Wetmore Hodges is president, Kellogg Birdseye, vice president and treasurer, and Horatio Alden, secretary.

It is appropriate that there should be centered in Gloucester a variety of manufacturing concerns whose products are collateral to the great American fishing industry which has been her birthright from the beginnings of the Cape Ann settlement, and today one can buy at the very doors of the plants, nets and twines, dried, pickled, canned, salted, and smoked fish, oiled clothing of all types, cod liver oil, fog horns, wooden boxes and cooperage products, marine and copper paints, fishermen's spars, leather clothing, vessel supplies, including sheet metal specialties, anchors and castings, etc.

SOME OTHER GLOUCESTER INDUSTRIES

But Gloucester has been the birthplace of other ideas as well. Some years ago, Thomas P. Bolger, who had been brought up in the metal working trade, and whose earlier years had been spent as a manufacturer of steel household utility products, especially one that was a great necessity in those days when coal heaters and ranges predominated—the metal ash-sifter—believing that the day of the metal refrigerator had arrived, carried on a series of experiments and evolved a product which proved to be a pioneer in its field, and which, combined with electric-refrigerating units, and produced in attractive colored enamels, has resulted in building the Success Manufacturing Company into one of Gloucester's large industries.

One hundred hands are employed and the corporation has capital of $100,000. Thomas P. Bolger is president and general manager, and William A. Bolger is treasurer and secretary.

The Cape Ann Anchor & Forge Company began business in 1823, starting as a manufacturer of anchors, for the fishing fleet and coast trade. The company gradually worked into the manufacture of heavy forgings and at the present is making forgings weighing up to 16,000 pounds.

The anchor business was discontinued in 1916 and the products now manufactured include crankshafts, connecting rods, pinions, marine forgings, textile forgings, paper and rubber rolls, large rectangular shapes, rings, railroad forgings and shafting of all kinds.

F. A. Fisher is president, I. D. Nutton secretary, and E. L. Phillips treasurer, of this $100,000 corporation, which employs fifty operatives, and has one of the best equipped forge plants in the country.

HOME OF THE FAMOUS LE PAGE'S GLUE

Who in New England does not recall the good old days when, as boys and girls, they gaped in amazement at the cracked plate, which held together despite the heavy rock below that swung to and fro between the iron tripod, and mused on the magic that they were sure existed in Le Page's glue? These animated advertisements of the strength of this adhesive, which stood in front of stationery and drug stores half a century ago, were but expressions of the ingenuity of the founders of the Russia Cement Company, whose habitat is close to the sea whence come, through the finny tribe, the component parts of the formula. Today, the Le Page line includes more than twenty internationally known com-

modities, and the company maintains branches in New York, Chicago, San Francisco, and London, being capitalized for $1,100,000 and employing 250 operatives.

Charles E. Fisher is president, N. Carleton Phillips vice president, treasurer and general manager, and J. F. MacPhee, secretary of the corporation.

Founded in 1876 to develop the then recently discovered liquid glue which could be extracted from fish skins, this company has enjoyed an uninterrupted career of development and growth, and is today, as it has been for years, the largest producer of fish glues in the world.

Originally its product was called Russia belting cement, from which the company derived its name, but, in 1881, the glue was packed in household sizes and christened Le Page's, a name which is today a household word in every civilized country.

But the Russia Cement Company has amplified its scope still more. Under the same brand are manufactured mucilage, paste, china and rubber cements, while under the name "Signet," adopted in 1910 to cover non-adhesive products of the company, are manufactured writing ink, stamping ink, metal and silver polish, household oil, hand soap, and stove polish.

Its salesmen, who travel throughout both American continents, and its agents, who cover either directly or indirectly the rest of the world, all have contact with Gloucester. The name of the city appears on packages shipped by rail and by water, in fast freight cars and planes, as well as on the packs of burros, llamas, and camels. Le Page's glue and Gloucester are thus coupled together and the name of the city which cradled this notable industry is carried to the ends of the earth.

THE AMERICAN NET & TWINE COMPANY

In Gloucester is located the only Massachusetts plant of the American Net & Twine Company, which began the manufacture of all kinds of cotton and linen nettings, employed in the fisheries of the American continent, as early as 1842, when the business was set up, at 34 Commercial Street, Boston. Up to that time, the production of fish-netting was entirely carried on by hand, and was fashioned almost entirely of hemp twines imported from England. In 1844, James S. Shepard, of Canton, became connected with the company, and the production of the first cotton twine for netting made in this country was commenced. Ultimately, this product completely displaced the hemp twine in the American fisheries. The company invented machinery for the manufacture of netting, and by 1875 the original quarters becoming inadequate, the plant was removed to East Cambridge, where a factory especially designed for the needs of the concern was erected. For many years a cotton mill was operated by the company, in Canton, but today the concern concentrates all operations at the Gloucester plant. The company received the highest awards, in competition with other similar enterprises, at the Philadelphia Centennial, the London World's Fair of 1883, and the Chicago World's Fair in 1893. It employs about 125 operatives at the Gloucester plant, and has its Boston office at 575 Atlantic Avenue. Warren W. Barbour is president, James F. Turner clerk, and Robert Barbour treasurer.

OTHER ENTERPRISES OF GLOUCESTER

One of the units of the Booth Fisheries Company, whose capital is $10,000,000, and whose main headquarters are in Chicago, is located in

Gloucester; the Cape Ann Manufacturing Company locally employs 200 operatives in the manufacture of oiled clothing, the concern being owned by Morris Bell and Max Leavitt; the Davis Brothers Fisheries, Inc., with capital of $96,000, employs 150 in marketing fish, Fred E. Morris being the general manager of the concern; John F. O'Hara, president, and Patrick J. O'Hara, treasurer; A. W. Dodd & Co., Inc., with capital of $50,000, produces cod liver oil at Stoneham and Provincetown, as well as at Minturn and Vinal Harbor, Me., but maintains its main office in Gloucester, James A. Patch being president, Leighton H. York secretary, and Paul B. Oakley treasurer; the Gloucester Electric Company, with capital of $513,100, produces electric light and power, employing sixty operatives, D. Edgar Manson being president, and Elihu A. Bradley treasurer; the Gloucester Gas Light Company, capitalized for $215,000, employs forty in the production of gas; the Gloucester Salt Fish Company, with capital of $100,000, employs twenty-five in purveying salt fish, Charles F. Wonson being president and treasurer; Charles F. Mattlage & Sons Company, capitalized for $100,000, employs thirty-five in marketing dried and pickled fish, Fred A. Grant being president, and Charles E. Potts treasurer, of the corporation; the Merchants Box & Cooperage Company, with capital of $65,000, manufactures wooden boxes and employs 100 operatives, William H. Condon serving as president, R. Russell Smith vice president, and H. C. Tufts as treasurer; the Murmac Manufacturing Company employs twenty-five hands in the manufacture of expansion bits and hardware, John A. Moran being president, and Joseph I. Sullivan treasurer; L. B. Nauss & Sons, owned by Charles S. and Loren H. Nauss, capitalized for $120,000, employs thirty in the production of mill work, being one of the old-established concerns of the city; the Frank C. Pearce Company, with capital of $500,000, employs 100 hands in preparing and marketing fish, Frank C. Pearce being president and manager, and Charles F. Pearce treasurer and secretary, of the corporation; the L. E. Smith Company, with capital of $30,000, employs sixty in the manufacture of accessories for vessels and in producing sheet metal articles, Elliott W. Tarr being president, G. E. Cameron secretary, and S. Y. McKenney, treasurer; the W. A. Sullivan Shoe Company, Inc., is engaged in the production of footwear; Tarr & Wonson, Ltd., capitalized for $120,000, produce marine paint; the Universal Coat Company, with capital of $100,000, manufactures leather and sheep lined coats, and employs 100 operatives, and has its main headquarters at 89 Bickford Street, Jamaica Plain, Boston. These, with a number of smaller industries, complete the manufacturing enterprises of the city.

In 1927 there were eighty-four manufacturing establishments in operation in Gloucester, the total having risen from sixty-nine in a six-year period. In the same number of years the value of her manufactured products rose from $9,613,677 to $14,098,440, a most notable increase.

The eighty-four concerns represented in 1927 a capital investment of $10,260,245; they used stock and materials valued at $8,812,374, and employed 2,255 workers, to whom were paid $2,499,392 in wages.

The principal industry in Gloucester is the canning and preserving of fish. The product value in this industry, $5,612,679, constituted 39.8 per cent of all manufactures in the city in 1927, and gave employment to 863 persons, or more than one-third of all the wage-earners engaged in manufacturing. Other important industries in 1927 were the manufacture of glue, knit goods, men's clothing, nets and seines, and wooden boxes.

CHAPTER XXI

BEVERLY

HOME OF THE UNITED SHOE MACHINERY CORPORATION

Beverly did not assume her place as an industrial town until just about 100 years ago, her activities being more or less inseparably connected for many decades with adjoining Salem in owning and operating ships that traversed the seas and which brought to her docks cargoes that netted their owners fabulous sums in the heyday of North Shore ocean commerce.

The manufacture of britannia ware was begun in the town, in 1812, by Israel Trask.

It was in 1829 that Capt. Thomas B. Smith built the first local boot and shoe factory, and it was not until the next year that Daniel Lefavour began the manufacture of women's shoes at the Cove. The days of the prominence of Ebenezer Moses, the Herricks, Trasks, Crossfields, Larrabees and Wallises in the shoe production field were yet to dawn.

In 1843 the manufactured products of Beverly were valued at $120,000, the total capital invested in industrial enterprises was $40,000, while 500 persons were employed in the local establishments.

Boots and shoes, cabinet-ware, chairs, britannia, tin-ware, brick, hair, mustard, soap and candles constituted the products of that era.

Beverly's cotton manufacturing experiment, which began in 1787, is dwelt upon at length in the chapter devoted to the first cotton textile enterprises of the commonwealth.

It was not until the closing days of the last century that the hand of a genius was applied to the confusion, duplication and waste of energy prevailing in the shoe machinery field, and order was brought out of chaos, that Beverly saw its industrial future definitely determined.

True it was that the city was the seat of a number of small manufacturing plants at that period, but not until it became the center of the manufacturing activities of the United Shoe Machinery Corporation did it possess an outstanding industrial unit such as it boasts of today.

The story of the inception and growth of this industrial giant is told in the chapter devoted to the industries of Boston, in which city its headquarters have been located from the beginning of its activities.

In Beverly is located one of the units of the Hoague-Sprague Corporation, which in its Lynn and Beverly plants employs 450 persons in the manufacture of wooden and paper boxes, largely used by the shoe trade, the concern being an amalgamation of many small companies which formerly operated in Essex County, and elsewhere, and the largest producer of boxes in Massachusetts.

Its detailed history is carried under the chapter dealing with the industries of Lynn, where its headquarters are located.

The Howard W. Hill Company was formed in 1924 to take over the business of P. A. Field Shoe Company, which was formed in 1889. Some years later, in an effort to secure additional room, P. A. Field, the founder, moved to Salem, where the company occupied a large factory, which was

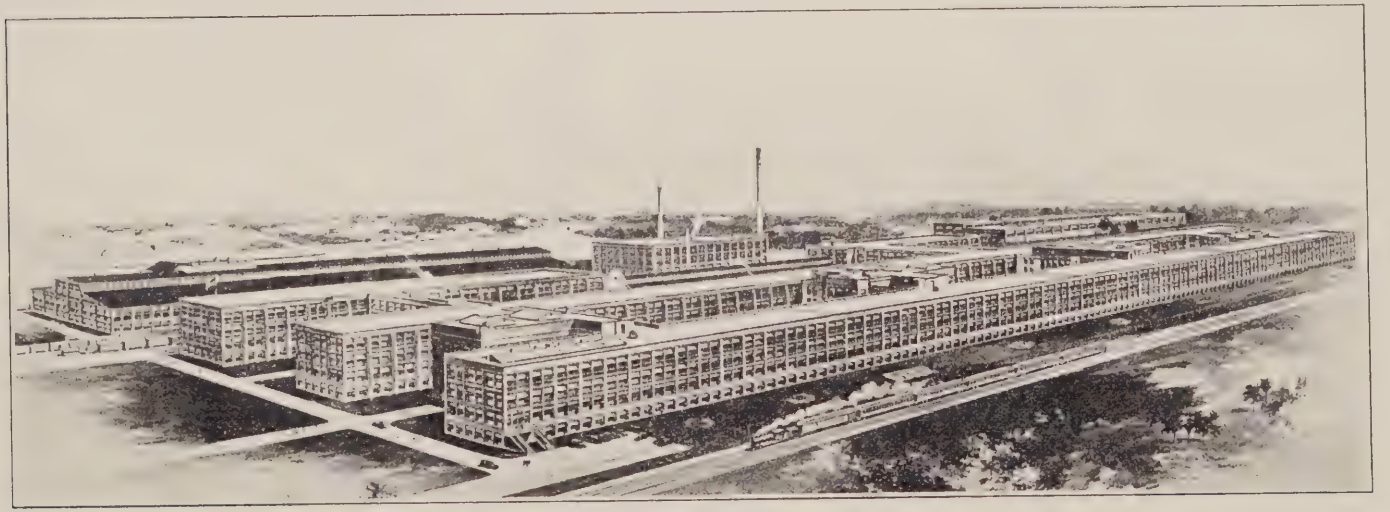
destroyed in the great Salem fire. Mr. Field immediately arranged to start again in Beverly, and at that time Howard W. Hill became associated with the concern, in the capacity of sales manager. During the next ten years he was an important factor in the progress of the company, and when Mr. Field retired, Mr. Hill reorganized the business and adopted the present name.

One of the company's 150 employees has been continuously with it for more than thirty-nine years, while a great many others have given a quarter century of service.

Howard W. Hill is president and treasurer, Warren L. Delaney vice president, and M. A. Woodberry secretary, of the corporation.

The Millett Woodbury Company, of which George E. Rowe is president and treasurer, Philip K. Rowe, vice president, and Winthrop E. Foley, secretary, employs 250 operatives in the manufacture of shoes; the Fred W. Bartlett Shoe Company, of which Fred W. Bartlett is president and treasurer employs 125 in the production of men's and boys' McKay shoes; D. H. & G. H. Bell, owned by Donald H. and Gordon H. Bell employ 100 operatives in the manufacture of footwear; the Beverly Last Company, owned by E. F. Bell, manufactures shoe lasts, and employs twenty-five operatives; Bray-Stanley & Ellis, Inc., rank among the large Beverly industries, employing 300 in the manufacture of men's and women's felt shoes, Ralph D. Stanley being treasurer, Moses Ellis president, and Harry Stephenson, secretary; Daly's Golden Rule Shoe Company operates its No. 2 plant in the city, employing fifty or more in the production of women's McKay and welt shoes; Flint Brothers, owned by Harry O. and Frank E. Flint, employ fifty operatives in the production of infants' and children's footwear; Reid Brothers, owned by Robert and Andrew S. Reid, manufacture surface grinders, and employ twenty-five operatives; the Reliance Shoe Company, of which J. J. Lippitt is president and treasurer and Harry Ober, secretary, employs 100 in the manufacture of women's McKay shoes; the Scharnagel Leather Company, owned by Robert F. Scharnagel, employs twenty operatives in its sheep-skin tannery; F. W. Stuart & Co., owned by Frank W. Stuart, employs fifty in the manufacture of shoe lasts; the A. J. Tower Company, with capital of $500,000, is engaged in the manufacture of waterproof clothing and oiled fabrics, Philip Stockton being president, Edward W. Swan, vice president, Ralph G. Kilmer, secretary, and R. F. Herrick, treasurer; the Beverly Mattress Company manufactures felt for mattresses; the Allen Show Print, owned by Archer I. and Herman K. Allen, employs forty in the production of poster printing; the Balloon Rubber Heel Corporation, with capital of $785,290, employs fifty operatives in the production of rubber heels and soles, D. G. Gray being president, Frederick J. Gleason, vice president and general manager, and Max Brown, treasurer; and these concerns, with the United Shoe Machinery Corporation and the United Shoe Repairing Machine Company, with a few smaller enterprises, complete Beverly's industrial picture.

In 1927, Beverly's forty-six manufacturing establishments had aggregate capital of $13,247,089, the total value of all products manufactured in the city that year was $12,924,157, an increase of $1,743,268 over the previous year, and of $2,303,906 over 1921. The value of stock and materials used in manufacture was $3,792,298. The average number of wage-earners employed during the year was 3,037, and the total amount paid in wages was $5,141,784.



UNITED SHOE MACHINERY CORPORATION FACTORY, BEVERLY

The principal products manufactured in Beverly in 1927 were shoe machinery and boots and shoes, the value of those produced in 1927 being $1,050,203 more than that of the preceding year.

The figures applying to shoe machinery, the principal industry of the city, cannot be shown separately without disclosing the operations of an individual establishment.

CHAPTER XXII

PEABODY

THE GREAT LEATHER CENTER OF ESSEX COUNTY

In 1739 Joseph Southwick, a Quaker, established a tannery in Peabody, then South Danvers. By 1855 this lone tannery had grown to twenty-seven manufacturing units of that type, with an annual production of 131,000 hides, valued at $666,000, with 122 men employed. In addition there were twenty-four currying plants in the town, finishing leather valued at $805,000, and employing 153 hands. The value of the morocco and lining skins treated was $25,000, the concerns engaged in this type of production being capitalized at $50,000, employing 117 workers, and handling 80,000 hides annually.

The same year (1855) 747,600 pairs of boots and shoes were manufactured in the town, valued at $597,259, and 1,043 men and women were employed in their production. During the early part of the nineteenth century upwards of thirty local potteries were in operation, but by 1855 only two of these units were in existence.

Glue was first manufactured in South Danvers in 1817, by Elijah Upton, the founder of the American Glue Company of today, and in 1855 there were three glue factories in the town, capitalized at $40,000, giving employment to twenty-five men, and turning out products valued at $120,000 annually.

That year the local manufacturing concerns included, besides the above, two soap factories, a patent leather plant, a last factory, a box concern, two bakeries and several quarries.

In 1927, out of eighty-six industries in operation in the City of Peabody, thirty-eight, or more than 44 per cent in number, were engaged in tanning, currying or finishing leather.

Peabody and vicinity pays the highest leather wages in the world and manages to keep up with its competitors because of the skill of its operatives and the inventive qualities and good management of its manufacturers. But this is a constant daily effort in which the worker and the owner are mutually engaged.

In 1927 the leather industry, which constitutes so important a part of manufacturing along the North Shore, enjoyed what was considered by many to have been the best since the war. Production increased in footage, as well as in quality, while prices advanced per square foot, and some profits were made on rising markets. The district including Lynn, Peabody, Salem and Danvers, one of the largest in the United States for the manufacture of light leather for shoes and other goods, witnessed an increased consumption of upper leather, the production of men's shoes, which had been declining since the World War, taking a turn upward.

Exports of leather, especially of the patent types, showed a substantial gain in 1927, and the only alarming factor as viewed by the North Shore leather producers is the increasing importation of calf leather from Canada, Germany, France, Holland and England, which has caused the

Essex County manufacturers to join with other American tanners in demanding of Congress a protective tariff for their industry.

One of the new and growing ideas successfully tried out by some of the North Shore tanners is that of spraying by means of an air gun a lacquer on leather to produce a luster or finish, which is sometimes called silk kid. The process is not unlike that of spraying an automobile, and color effects, some of much beauty, are obtained. The leather, like automobile finsh, resists mud and even grease. Pearl luster leather is made by the application of artificial pearl, or liquid fish scale, now manufactured by a secret process, at Hyannis, by the Cape Cod United Products Company.

Some tanners of fancy leather, including suede calf, benefited much during 1928 from the fashion, common among women, of carrying under-the-arm bags to match shoes, and also from the vogue of leather garments for sports, including motoring.

Sheepskin tanners tell of a better year for their business.

North Shore tanners are confronted by the problem of competition with large shoe manufacturing concerns who operate tanneries for the manufacture of leather for their own shoe factories. It is frankly admitted that these shoe firms have taken a considerable volume of business away from the Essex County tanneries.

Increase in the production of leather during 1928 benefited allied firms, such as makers of glue, gelatine and hair felt and others who make tannery by-products into useful merchandise.

Among the leading industries of Peabody are the Danvers Bleachery, established in 1847, by Elijah Upton and T. W. Walker, with original capital of $150,000, and now a part of the Naumkeag Steam Cotton Company, employing 700 hands. This unit was recently greatly enlarged and it ranks as one of the largest bleacheries in New England.

THE NATHAN H. POOR COMPANY

Nathan H. Poor, founder of the Nathan H. Poor Company, a pioneer in the application of scientific methods to tanning and the finishing of sheep and goat skins, formed the partnership of Henderson & Poor, in 1875, and became president of the concern that bears his name in 1899. Four years later the company moved to its new factory—the first in the United States to use the fan system for the drying of skins, a policy since adopted by all the leading manufacturers. Mr. Poor also originated the idea of coloring skins in a drum or wheel, a method which provided more uniform colors than was possible under the old hand treatment.

In 1926 it brought out a chamois leather, white in color, that is made by a new secret process, instead of employing the usual fish oil tannage.

Mr. Poor lived to the ripe old age of eighty-five years, dying April 17, 1927, but he was active in the management of the concern to the end.

The Nathan H. Poor Company employs upwards of 100 operatives, and its present officers are: President, Nathan H. Poor, II, son of the founder; treasurer, George H. Poor; and secretary, William P. Trask.

THE A. C. LAWRENCE LEATHER COMPANY

In the late '70s, throughout the '80s, and during the early '90s, a leather business was conducted in Boston in which A. C. Lawrence was first employed and in which he later became a partner and leader. The firm

was first known under the name of Allen, Field & Lawrence, and later as A. C. Lawrence & Co.

These houses dealt in a variety of upper leathers as merchants, rather than as tanners. In those days it was customary for the leather merchant to buy raw hides and skins and to sell the leather product, but to have the raw material converted in tanneries owned by others. Alliances with particular tanners were naturally formed, and, later on, joint ownership of tanneries resulted.

In 1897, A. C. Lawrence & Co. owned a tannery in Peabody and the partners held a controlling interest in the Winchester Tannery Company, of Winchester, N. H., and the concern concentrated its activities in the tanning, finishing and sale of sheep leather.

Through successful coöperation, during and following the panic of 1893, with the packing firm of Swift & Company, relations were made which resulted, on May 1, 1897, in the incorporation of the A. C. Lawrence Leather Company, with Swift & Company owning a part interest.

The sheep business of the concern was expanded, and within a few years attention was given to the production of side, upper and calf leathers, with further extension of plant facilities at Peabody and the addition of a third organization—the National Calfskin Company—to the so-called Lawrence group. In natural course, various specialized lines from these three classes of raw material—sheep, light hides and calf—were developed; such as, wool skins tanned with the wool on, lamb skin glove and fancy leathers, suede calf, chrome patent side leather, Goodyear welting and innersoles.

With the growth of the business and its consequent need of larger capital, Swift & Company became predominant, and, later, sole owners.

Meanwhile, Swift & Company had developed a considerable interest in the heavy leather business, partly by the ownership of tanneries and partly by contract operations, and, in 1919, the entire leather business of Swift & Company was segregated. The National Leather Company was formed to take over this leather business, and the capital shares of that concern were sold to the more than 30,000 shareholders of Swift & Company. Since that year the National Leather Company has owned and operated the A. C. Lawrence Leather Company, the National Calfskin Company, both located in Peabody, and the Winchester Tannery Company, in the upper leather field, and the Ashland Leather Company, in the heavy leather manufacture. In addition, it has part ownership in England, Walton & Co., of Philadelphia, and in the Saint Joseph Tanning Company, of Saint Joseph, Mo., also heavy leather tanners, as well as in the Clinch River Extract Company.

The National Leather Company and its wholly owned subsidiaries employ about 3,000 persons; do an annual business of about $25,000,000; maintain headquarters in Boston; and has its principal tanneries in Peabody, in this state, and in Ashland, Ky., with others at Winchester, N. H., Saint Paul, Minn., and Middleville, N. Y. It purchases raw hides, skins and tanning materials in all quarters of the globe, and for distribution of the products maintains branch offices in all the important shoe manufacturing centers of the United States, and has established connections in all foreign countries.

Willis R. Fisher is president of the A. C. Lawrence Leather Company, F. J. Kitchell is vice president, Frank W. Crocker is secretary, and H. J. Nichols is treasurer. The concern employs upwards of 1,650 employees at its Peabody plant and has capital of $4,500,000.

THE L. B. SOUTHWICK COMPANY

About fifty years ago Josiah B. Thomas and Lewis B. Southwick formed a partnership, under the name of L. B. Southwick & Co., for tanning and manufacturing sheepskins into leather. Josiah B. Thomas had been identified with a number of enterprises, among them the wholesale meat business, sheep slaughtering, and wool pulling. Primarily to find a more favorable outlet for one of his principal by-products, sheep pelts after the wool had been removed, his interest was aroused in the tanning of sheepskins.

The Southwicks were a family of tanners, and it was a natural sequence that these two men should have been brought together in the business which they started. Lewis B. Southwick and his brothers had been engaged in a similar business in Peabody, and his brother, Horace A., was one of the founders of the tannery which today comprises the A. C. Lawrence Leather Company.

The L. B. Southwick Company took over the old Jarvis wool shop, and this location is a part of the land occupied by the present-day organization. From antiquated methods in the generation-old tannery there has been evolved one of the most modern sheepskin tanning plants in the country. Since its incorporation as The L. B. Southwick Company, in 1906, extensive additions, alterations and improvements have been continually made in the plant, until today the character of the business has been entirely revolutionized and not a vestige of the original tannery remains.

From a daily output in the original plant of about fifty dozen, restricted to practically one tannage and a limited number of finishes, the company today produces 1,000 dozen per day in various finishes and colors, suitable for all the requirements of the trade, and in normal times employs 500 men. The product consists of a large and varied line of sheep leather, not alone catering to the big shoe trade, but also to the novelty and specialty lines as well.

Lewis B. Southwick lived long enough to partially appreciate the progress and growth of the company bearing his name.

In the years following the death of Josiah B. Thomas, the efforts of some of those formerly connected with his various enterprises were gradually concentrated on the sheepskin tannery, and their foresight and service are responsible for the present day growth and prosperity of the concern.

Conspicuously among these should be mentioned Elliott L. Macdonald, whose untiring energy, keen perception, and executive ability, displayed throughout the struggling years of advancement, entitles him to the important position he now holds of president and general manager.

E. L. MacDonald is president, P. H. Thomas is treasurer, and R. A. Macdonald is secretary of the corporation, which has capital of $1,000,000.

THE TURNER TANNING MACHINERY COMPANY, AND OTHER CONCERNS

Practically the first machine to produce a radical change in the leather industry was the invention of J. C. Vaughn, who, in 1883, patented the putting-out machine, which eventually came to be regarded as indispensable in the morocco and light leather fields. Additional patents or improvements followed and all were taken over by The Turner Tanning Machinery Company—today the largest leather machinery concern in the world.

In 1887, Mr. Vaughn invented and patented the beam-house machine,

for fleshing, unhairing, slating, scudding, or fine hairing. The year previous, John Rood, an employee of Mr. Vaughn's, invented a shaving machine which possessed innumerable advantages over all previous devices for shaving leather. Capitalized for $600,000, The Turner Tanning Machinery Company employs 200 operatives. J. H. Connor is president, S. Winslow, Jr., vice president and treasurer, and E. N. Chase secretary.

The Morse Blacking Company was established in 1888 and for more than forty years has made leather finishes for the tanners exclusively and today is doing the largest business in its history, shipping its products all over the world.

The concern was founded by George D. Morse. Later his two sons, J. Ellison Morse and George D. Morse, Jr., were taken into the company, with a grandson, J. Ellison Morse, Jr., and these three are still connected with the business.

In 1907 H. V. Hunt and Burt W. Rankin incorporated the Hunt-Rankin Leather Company, for the manufacture of calf leather, the present daily capacity of the up-to-date plants of the concern being 6,000 calfskins. A considerable quantity of its product enters the export market. Some 500 hands are constantly employed in the Peabody factories and Boston office. Mr. Hunt is president, Mr. Rankin treasurer, and H. E. Cousens secretary, of the corporation.

In 1911, Bertrand E. Cox leased the Pemberton Brothers shop and organized the B. E. Cox Leather Company, which today employs 175 operatives in the manufacture of shoe, glove, fancy and sheep leather, the concern being capitalized at $100,000, and having a capacity of turning out 600 dozen skins a day.

Malcolm Cox is president, Bertrand E. Cox treasurer, and J. T. McCulloch secretary.

Among Peabody's other leading industries are the Densten Felt & Hair Company, Inc., which was incorporated in 1908, with capital of $350,000, employing 100 hands in scouring hair and wool and the manufacture of hair felts, J. J. Densten being president, David H. Crompton, vice president and William C. Burton, treasurer; the Griess-Pfleger Tanning Company of Massachusetts, has its main plant in Peabody, with a branch tannery in Natick, and a Boston office at 179 South Street, employing at all three units 250 operatives, Edward Pfleger being president, Thomas S. Kiernan, vice president and Ernest Griess treasurer and secretary, the history of this concern being carried in the chapter devoted to the manufactures of Middlesex County; Rosenthal Brothers Leather Company, owned by Morris, Louis, and Eugene Rosenthal, employs sixty operatives in the tanning of sheep leather, and maintains a Boston office at 204 Summer Street; Winslow Brothers & Smith Company, whose history is treated at length in the industries of Norwood, where its main plants are located, operates a large tannery in Peabody, where sheepskin leather is produced; the Essex Gelatine Company, a subsidiary of Swift & Co., of Chicago, manufactures gelatine, in an up-to-date plant, in Peabody; The American Glue Company has one of its six Massachusetts plants in the city; the Atlas Radio Corporation employs seventy-five operatives, in the manufacture of radio tubes, the concern being a partnership made up of Clarence J. Ferguson, Joseph J. Jackman, and F. H. Caskin, Jr.; the Barr Chemical Company, with capital of $100,000, F. Moise, president, and P. Moise, treasurer, manufactures fertilizer; James F. Barry employs fifty hands in the manufacture of goat and sheepskins; the Bell Leather Corporation,

Saul L. Cohen, president, Michael Cohen, secretary, and Coleman D. Cohen, treasurer, employs seventy-five operatives in the manufacture of India sheep and goat skins; W. J. Budgell & Sons, with capital of $110,000, employ 100 operatives in the production of sheepskins, Frank W. Budgell being president and treasurer and Elmer W. Budgell secretary of the corporation; the Carr Leather Company, capitalized for $50,000, employs 100 operatives in the production of upper leather, Thomas S. Carr being president, and Felix Carr secretary, of the corporation; the Chain Leather Company, with capital of $64,280, employs 100 operatives in the manufacture of upper leather, Elmer E. Chain being president and treasurer, and F. A. Norcross secretary, of the concern; the Dimond-Grynkraut Kid Manufacturing Company, with capital of $245,000, employs 250 operatives in the manufacture of glazed kid leather, I. Dimond being president and treasurer, Doctor Grynkraut vice president, and R. E. Baker secretary; William F. Duffy & Son, owned by W. F. Duffy, employs fifty hands in the production of morocco leather; the Essex Tanning Company, with capital of $50,000, employs 100 hands in the manufacture of leather, H. L. Rice being president, H. W. Davis secretary, and W. T. Langmaid treasurer; the Goodhue Leather Company, owned by M. H. Anderson and John J. McCarthy, manufactures sheepskin leather; Greene & Hayes employ 100 operatives in producing sheep and goat skins; the Korn Leather Company, with capital of $125,000, employs 100 operatives in producing split leather, Max Korn being president and treasurer, and Patrick Crowley secretary; the Littlefield-Legal Leather Company, capitalized for $200,000, with A. S. Littlefield president and treasurer, W. F. Littlefield vice president, and A. V. Littlefield secretary, are engaged in tanning and finishing leathers; N. C. Lyon & Co., a partnership made up of N. C. Lyon, and Gregory O. Lyon, with capital of $500,000, are engaged in tanning leather; E. W. McCarthy & Sons, owned by E. W. and E. T. McCarthy, employ fifty operatives in producing leather; John McCarthy & Son, Inc., with capital of $50,000, employ seventy-five operatives in the manufacture of sheep leather, John C. McCarthy being president, Joseph P. McCarthy secretary, and John J. McCarthy, treasurer; the Marine Brass Hardware Company, capitalized for $100,000, employs seventy-five operatives in the production of brass and bronze ship hardware, Robert S. Laughlin being president, and A. L. Jordan treasurer; the Morrill Leather Company, with capital of $100,000, of which Governor Frank G. Allen is president, and Kenneth S. Domett treasurer, is engaged in the production of sheep leather; F. P. Osborn, Inc., of which S. E. Osborn is president and Philip Osborn is treasurer, employs fifty operatives in the production of sheep leather; the Pearse Leather Corporation employs fifty operatives in the production of fancy leather, Ernest Pearse being president and treasurer, and Alfred E. Pearse vice president; the John J. Ryan Shoe Company employs 100 operatives in the manufacture of boys' shoes, John J. Ryan being president and treasurer of the corporation; the Strauss-Limon Leather Company, with capital of $100,000, employs 125 operatives in the production of split leather, B. H. Strauss being president, M. Limon vice president, and N. W. Amur treasurer; the Tanners Products Company, with capital of $2,679,000, employs seventy-five operatives in conditioning hair and wool, V. A. Wallin being president, and T. H. Jones treasurer and secretary; the Andur-Limon Leather Company, with capital of $200,000, employs 250 operatives in the production of split leathers, M. Limon being president and N. W. Andur, treasurer and secretary; Frank Espindle and

Manuel and John Marshall, doing business as F. Espindle & Co., employ thirty-five hands in the manufacturer of heeling, inner soles and leather board; the Essex Gelatine Company, with capital of $400,000, manufactures gelatine, George H. Swift being president, Frank W. Crocker secretary, and Charles W. Benjamin treasurer, eighty hands being employed; the Kirstein Tanning Company, of which David Kirstein is president and treasurer, and Myer Kirstein secretary, manufactures leather; the Massachusetts Hair & Felt Company, with capital of $150,000, employs fifty operatives in the production of animal hair, V. A. Wallin being president, T. Wilde vice president, and E. T. Munson secretary and treasurer; H. S. & W. M. Snyder, Inc., of which H. S. Snyder is president, and M. W. Snyder treasurer, employs 150 in the manufacture of leather, the concern having capital of $600,000; Tarlow Bros. Embossing Company, a partnership made up of Menis I. and S. Tarlow, employs fifty hands in manufacturing embossed and finished leathers; the Trimount Leather Company has capital of $25,000 and employs fifty hands in producing leather, John S. Martin being president and treasurer, and W. C. Martin secretary of the corporation; the Wetan Leather Company employs seventy-five operatives in manufacturing tanned, finished and embossed leather, M. Steinharter being president and Arthur Junokas treasurer; the Woburn Degreasing Company of Woburn operates one of its factories in Peabody; E. A. Woelfel-Cox, Inc., with capital of $50,000, employs thirty in producing embossed and decorated leather, cloth and paper, E. A. Woelfel being president and B. E. Cox treasurer; Thayer-Foss Company, of Woburn, operates one of its tanneries in Peabody; the George C. Vaughan Company, of which George C. Vaughan is president and treasurer, is engaged in producing sole leather; the Verza Tanning Company, with capital of $100,000, employs 100 in the manufacture of calf and side leather, Frank A. Page being president, and Louis Verza treasurer; Wright & Wright, Inc., with capital of $45,000, employs fifty operatives in the production of upper leather, Frank E. Wright being president and treasurer of the corporation; and the Richard Young Company, with capital of $1,000,000, is engaged in the production of leather, Richard Young being president, F. A. Chilton and F. E. Foster vice presidents, A. L. Gillespie secretary, and J. J. Gill treasurer. The concern employs 225 operatives.

In 1929, the London Produce Company, one of the largest corporations in the leather world, leased a part of the Elcivo Leather Company's plant and began the manufacture of leather.

The same year the Crescent Chemical Company began the production of finishes for shoes and leather in a local plant that had been idle for some time.

Peabody, a city of 20,000 people, has a number of smaller industries. The total value of all products manufactured in her eighty-six establishments in 1927 was $30,977,436, or $2,276,739 more than in 1926; and the value of stock and materials used in manufacture was $15,915,455. The average number of wage-earners employed during that year was 6,389, and the total amount paid in wages was $8,263,291.

The principal products manufactured in Peabody in 1927 were: Leather, tanned, curried, and finished; glue; foundry and machine-shop products; and dressed cattle hair. The dyeing and finishing of textiles was also an important industry.

But the value of the leather products was $22,515,682 of the total of $30,977,436 for all commodities. This figure was $3,785,246 more than the value of such local products in 1921, and $3,184,418 more than the value of the leather products made in the city in 1926. Of the total wage-earners in Peabody in 1927—6,389—there were 4,400 employed in the thirty-eight establishments devoted to tanning, currying and finishing leather.

CHAPTER XXIII

NEWBURYPORT

CITY OF DIVERSIFIED INDUSTRIES

In 1644 the first regular or systematic attempt at an improved manufacture of cloth—particularly of woolen—was made by a company of Yorkshiremen, who, in 1638, settled at Rowley, in Massachusetts, nearly midway between Ipswich and Newbury and so closely connected with the latter town was this movement that it seems appropriate to consider it a Newbury-Rowley-Ipswich adventure. The group consisted of about twenty families of industrious and pious people, under the direction of their minister, Rev. Ezekiel Rogers, one of the proscribed non-conforming ministers of England, and a descendant of the first Protestant martyr, John Rogers, who suffered at Smithfield, in the reign of Queen Mary. Rowley was incorporated in 1639, and the people soon after commenced the manufacture of cloth, which had been the occupation of many of them in England. Here they built the first fulling-mill erected in the North American colonies. The factory is said to have been constructed by John Pearson, about the year 1643. It stood just above the head of the tide on Mill River, where it was still in operation in 1809, and a cedar tenter-post, brought by them from England, remained perfectly sound at that period.

This appears to have been the first place at which woolen cloth was made in New England. Flax, hemp, and cotton had previously been wrought into cloth, but whether by the weavers of Rowley, or in families generally, under the stimulus applied by the Legislature, which produced two years before several claimants for the bounty, does not appear clear. The author of "New England's First Fruits," writing at Boston, September 26, 1642, speaks of their providential help, among other things, "in prospering hempe and flaxe so well that it is frequently sowen, spun, and woven into linen cloth (and in short time may serve for cordage) ; so cotton wool (which we may have at reasonable rates from the islands) and our linen yarne, we can make dimittees and fustians for our summer clothing; and having a matter of 1,000 sheep, which prosper well to begin withal, in a competent time we hope to have woollen cloth there made. And great and small cattle being now very frequently killed for food, their skins will afford us leather for boots and shoes and other uses; so that God is leading us by the hand into a way of clothing."

Although the people of Rowley were from the woolen districts of England—especially the seat of the broadcloth manufacture—flax and cotton, as well as wool, appear at first to have formed a considerable part of their raw materials. But although after the introduction of fulling-mills, much of the woolen cloth of household manufacture was worn in its unfulled and unfinished state, the mention of the Rogers group as the first clothmakers, must be understood to imply the first manufacture of fulled and dressed cloth, or cloth wholly of wool, of which none was previously made, as may be inferred from the above passage. The industry of the Rowley weavers is frequently commended. "These people being very industrious every way, some built many houses to the number of threescore families; and were the first that set upon making cloth in this western world; for

which end they built a fulling-mill, and caused their little ones to be very diligent in spinning cotton wool, many of them having been clothiers in England, till their zeal to promote the Gospel of Christ caused them to wander." Governor Winthrop also mentioned their use of cotton:—"Our supplies from England failing much, men began to look about them, and fell to a manufacture of cotton, whereof we had store from Barbadoes, and of hemp and flax, wherein Rowley, to their great commendation, exceeded all other towns."

JOHN LEE—AN INDUSTRIAL BOOTLEGGER

John Lee, who, early in the nineteenth century, became the proprietor of the Byfield factory, succeeded in shipping clandestinely from England, in large casks labeled as "hardware," in charge of his brother-in-law, James Mallalow, a quantity of cotton machinery, consisting of drawing and spinning frames, or mule throstles, while, to avoid suspicion, they followed in another vessel. The machinery was installed at Byfield, where at first it was employed in spinning wick yarn and warp, which were in much demand for household manufactures. Bed ticking, coarse gingham and sheeting and other products, all woven by hand, were subsequently added to the production. This factory is said to have been one of the first in America to produce these classes of textile products.

Newburyport serves as another typical example of a community adopting itself to changing economic conditions. From 1655, when Capt. Paul White built the first wharf, at what is now the foot of State Street, until the middle nineties of the last century, any industrial resume of the town and city would have been incomplete that omitted reference to her custom house, established in 1684, which has entered and cleared vessels at Newburyport since 1764 (when the municipality was set off from the old town of Newbury), up to the present date, or that failed to recount the building there of the frigates *Boston* and *Hancock,* in 1776; the *Protector,* in 1779; the sloop of war *Wasp,* in 1813; the U. S. gunboat, *Marblehead,* during the Civil War; or the hundreds of merchant and clipper ships of later years, including the unrivalled *Dreadnaught,* which became known by the sailors of all nations, as the "Wild Boat of the Atlantic," and which, in 1860, made the voyage from Sandy Hook to Queenstown, in nine days and thirteen hours, a record never equalled before or since by a sailing craft.

AN UNRIVALLED GALAXY OF SHIP BUILDERS

The names of William Currier, James L. Townsend, John Currier, Jr., George W. Jackman, Jr., Eben Manson, Charles H. Currier, George E. Currier, John Currier, III, William B. Coffin, John W. S. Colby, Enoch P. Lunt, B. F. Atkinson, John T. Fillmore, and others, are deserving of as signal recognition in the annals of Massachusetts industry as are those of our great inventors such as Whitney, Howe, Bigelow, Crompton, and scores of others, for it was their genius, artisanship and engineering capacity that created and sent down the shipways of Newburyport vessels whose sailing performances caused capital from New York and elsewhere to seek the construction of ships by her famous local builders.

So, too, Newburyport may justly claim a share of the honors that ultimately came to Donald McKay, the greatest builder of clippers of all time, for it was in the Essex County town that, at the age of thirty, he launched out as a master shipbuilder, and there he became a partner, for a brief time, with John Currier, Jr., before removing to East Boston. When the *Joshua Bates,* the pioneer ship of Enoch Train's Liverpool sail-

ing packet line, glided gracefully into the Merrimack, from the Currier and McKay yard, the genius of Donald McKay was established.

For many decades it was the proud boast of Newburyport that she could locally outfit the largest vessel built at her shipyards with every device requisite to start a voyage, with the possible exception of sailcloth. All ship hardware of every variety, cordage, anchors, metal fittings, etc., were produced there, three large rope walks being maintained at one period.

THE BEGINNING OF SILVERSMITHING

As early as 1690, William Moulton was established as a silversmith in that part of Newbury now included within the limits of Newburyport, and was followed by his son, Joseph, by Jonathan Stickney, Francis Titcomb, Theophilus Bradbury and his son, Abel Moulton, John W. Davis, Nathaniel and Thomas Foster, Joseph Moulton, John E. Lunt, John G. Pearson & Co., James B. Fairbanks, Andrew M. Paul, Alfred Osgood, and many others, who attained high rank as silversmiths, goldsmiths, and jewelry manufacturers.

When Newburyport was set off from the old town of Newbury, and was incorporated, in 1764, it was territorially the smallest town in the Commonwealth. Three ship yards and a few cordage factories employing from twenty-five to fifty operatives, and producing between two and three hundred tons of white lines, and tarred cordage annually, were the major industries of the period.

As early as 1759, Enoch Noyes began the production of horn combs and buttons in the town, and Moses Brown was manufacturing chairs there, prior to 1766.

Patriotism ran high at the time of the Revolution and thousands of pounds of saltpetre and lesser quantities of gunpowder were produced in the town in 1775 and 1776.

THE NOTABLE INVENTIONS OF JACOB PERKINS, AND OTHERS

The nail cutting machinery invented as early as 1790, by Jacob Perkins, of Newburyport, then twenty-four years of age, was not patented by him until January, 1795, and like many inventors, he found the product of his ingenuity, though efficient, a source of pecuniary embarrassment, in consequence of an injudicious partnership into which he entered at Amesbury, where a nail company was chartered, in 1805, with a capital of nearly half a million dollars.

In the *American Gazetteer*, published in 1797, mention is made of a machine, invented by Caleb Leach, of Plymouth, which would cut and head 5,000 nails a day, with the aid of one boy or girl, but the same publication alluded to Perkins' machine, which would turn out 200,000 nails a day, of a quality superior to the English product and 20% cheaper.

In 1810, Perkins received another patent for cutting nails and brads, and among other early inventions for cutting brads and small nails was a machine patented in 1807, by Jonathan Ellis, of Massachusetts, a partner of Perkins, and a brad and spring machine, by G. Jenkins, of Plymouth County, in 1817.

Jacob Perkins was awarded, in 1820, by the London Society of Arts, two large silver medals, for his methods of heating and ventilating rooms, and the holds of ships, and for improvements in engine hose; a gold medal for an improved ship's pump, and the Vulcan gold medal for a method of freeing water wheels from back water. He also received the thanks of the

Society for communicating to it certain parts of his siderographic process for multiplying copies of engravings, particularly with a view to the prevention of forgery.

In 1823, Perkins created a sensation in scientific and manufacturing circles of this country and England by receiving three other patents on an improved steam engine, which combined, with great simplicity of combustion and economies in cost, the weight of metal, space, and supply of water and fuel required, and which provided a great increase in power. A cylinder two inches in diameter, eighteen inches long, with a stroke of but twelve inches, produced ten horse power, with the use of but 1,848 cubic inches of water, and two bushels of coal daily. No new principle was claimed for the invention but rather the application of new principles constituted its advantage, the improvements relating chiefly to the boiler or generator, rendering it possible to return the heat to the boiler, thus permitting it to perform service a second time.

The splitting machine, invented by Samuel Parker, of Newburyport, was one of the greatest contributions made to the leather trade. Before it was conceived, leather manufacturers shaved a side of leather just as a carpenter planes a piece of wood, and consequently much valuable leather was wasted. Parker's machine made it possible to divide a hide into two sections, both of which could be utilized, one being the grain split and the other the flesh split, and two pieces of leather were created where but one existed before.

As early as July 16, 1813, Daniel Pierson, of Newburyport, was granted a patent on a printing press.

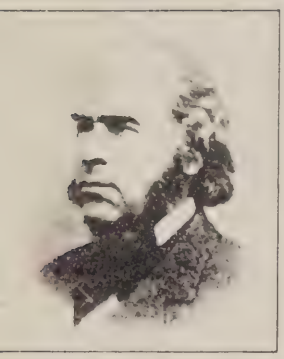
The pioneer manufacturing activities of Newburyport, as well as of the old town of Newbury, following the decline of local shipbuilding, for which the two communities were famous for many decades, were almost exclusively confined to textile operations. In their place have come a score of shoe and shoe finding concerns, as well as other sizable industries engaged in producing a variety of commodities.

The more recent period of industrial development has been away from textiles, and toward specialization in women's footwear, while during the past ten years silversmithing has shown marked growth, the industry also affording consistently steady employment to a considerable group of workers. Most of the other local industries have had their ups and downs during that period.

THE TOWLE MANUFACTURING COMPANY

The history of the silverware industry of Newburyport began in the mother town of Newbury long before the founding of the new municipality and the trade has been further developed, not only in the enlargement and growth of the Towle Manufacturing Company, but also in the advent into the city of two small hand-craft companies which are engaged in producing hand-wrought sterling silver articles. The major share of silverware—both sterling and plate—manufactured in the United States is fabricated in New England, and Newbury and Newburyport, taken together were among the towns to early undertake sterling silver production, until today it constitutes a very important part of the industrial life of this section of Essex County.

Three centuries ago, there lay riding at anchor in the neighboring waters of Cape Cod Bay, a small and fragile looking craft. In her scanty hold she had but lately borne across a stormy sea a little band of English



ANTHONY F. TOWLE
1850



SHOP OF A. F. TOWLE & SON,
NEWBURYPORT, 1870

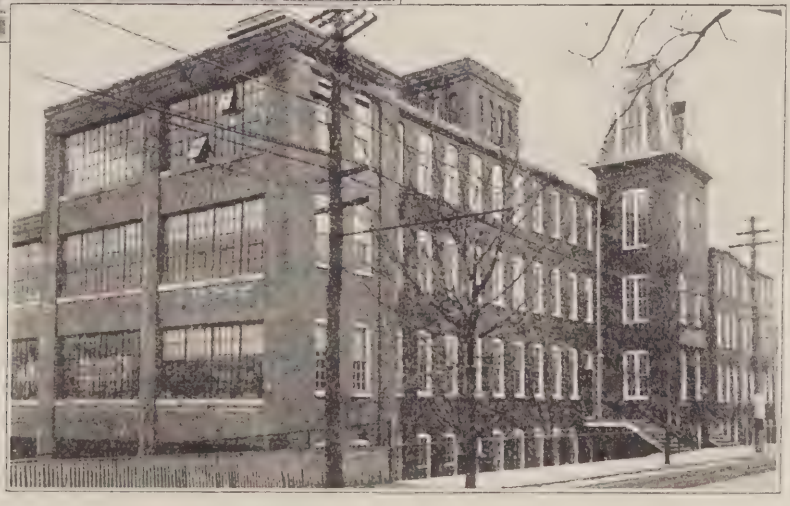


LUCIEN D. COLE
1880-1914
A LEADER IN
TOWLE HISTORY

THE MODERN PLANT OF THE TOWLE MANUFACTURING COMPANY
Newburyport, Massachusetts



Older Buildings
Fronting Merrimac St.



Office Wing
Added 1926

immigrants. Others had come before them to this western world—seekers of adventure, exploration, trade or colonization. Many, many thousands have come since, for the United States has ever been the *Promised Land.* But there have been none quite like these *Mayflower* Pilgrims. They were the advance guard of the great Anglo-Saxon immigration. Their purpose and their accomplishments were especially significant. Their lofty conceptions of liberty, justice and equality were to leave a lasting impress on the character and ideals of a vast nation.

Tradition has it that Mary Chilton was the first woman of this band of Pilgrims to set foot on American soil. She survived the rigors of that first winter, when half of the number died from the lack of the absolute necessities of life. Later she married John Winslow, brother of their first Governor Winslow. His brother followed a year later, on the good ship *Fortune.*

Her grandson, Edward Winslow (1669-1753), a prominent and public spirited man of Boston Colony, there plied the trade of a silversmith. Another pioneer silversmith and contemporary with him was one William Moulton, Jr., son of William Moulton, who emigrated from England and settled in Newbury in 1637. For seven successive generations this family of Moultons carried on the business of silversmithing in Newburyport, where there were also other prominent silversmiths.

Anthony F. Towle and William P. Jones, apprentices of Joseph Moulton, in 1857, set up a small silversmithing shop in Newburyport, under the name of Towle & Jones. In 1870, Edward P. Towle was admitted to the firm, which became known as Towle, Jones & Co. Three years later the firm was dissolved, Mr. Jones continuing to manufacture at the old location.

Messrs. A. F. and Edward B. Towle, under the firm name of A. F. Towle & Son, leased a factory, which they occupied until 1880 when they organized the Towle Manufacturing Co., and began the manufacture of silverware on a large scale in a brick building, on Merrimack Street. Three years later, the brick factory, erected in 1866 by the Merrimack Arms and Manufacturing Co., was bought, and has since been occupied by the Towle Company.

With the inspiration flowing from this historic background, the Towle Manufacturing Company, in a modern and up-to-date factory, carry on their work in sterling silver, maintaining a leadership in solid silver tableware of colonial, classic and modern styles in keeping with the finest traditions of this historic "Queen of Metals."

The concern employs from 300 to 350 skilled operatives. Its officers are president, W. A. Kinsman, vice president, H. E. Nock; treasurer and secretary, Jerome A. Hardy.

In 1818 the Eastern Stage Co. manufactured heavy coaches and one-horse carriages, while Robert Dodge, Samuel Rogers and William Wigglesworth were engaged in producing chaises.

Soon after 1827 a store in Newburyport was converted into a factory for the manufacture of woolen yarn and cotton batting, and was operated by Edmund Bartlet, who under the will of his father was given in trust, "all the fixtures, machinery and furniture in the steam mill," which the testator valued at $38,000.

In 1845 the factory was conveyed to Edward S. Lesley, who used it as a machine shop until 1860.

SOME LOCAL ADVENTURES IN TEXTILES

As early as 1827 the annual value of the product of three local flannel mills was $684,000.

In 1830 the manufacture of cotton bagging by steam power was begun in Newburyport and at that period the town boasted of the only stocking factory of any size in the United States—the Newburyport Hosiery Manufacturing Co.,—each female operator producing twenty stockings daily, said to be superior to the imported English hosiery of the period.

In 1833 the Essex Mill was incorporated, with $100,000 capital, and it continued textile operations until March 8, 1856, when the plant was destroyed by fire. In 1837 Bartlet's mills were established under the name of Wessacumcon Mills, but three years later the plant adopted the corporate name of Bartlet's Mills. The plant had capital of $350,000, operating with 448 looms, and 22,000 spindles and turned out 75,000 yards of sheetings and shirtings weekly. Destroyed by fire March 1, 1881, the factory was never rebuilt.

In 1842 the James Steam Mills were incorporated with $150,000 capital and subsequently operated as the Masconomet Mills, until 1876 when the plant was sold to a new company which changed the name of the concern to Victoria Mills. Equipped with 350 looms and 17,216 spindles the factory manufactured 48,000 yards of sheetings and shirtings per week.

In 1845 the Globe Steam Mills were started and in 1868 the Peabody Mills, with capital of $300,000, took over the plant. The equipment consisted of 400 looms and 19,000 spindles and print cloths and sheetings were manufactured.

In 1846 the Ocean Mill was incorporated and operated until 1868. Three years later a new company, capitalized at $300,000, took over the plant, and changed the name to Whitefield Mills. The equipment embraced 573 looms and 27,000 spindles and turned out weekly 100,000 yards of print cloth and sheetings, and in 1888 a thousand employees were on the payroll.

The influence of these textile units on the growth of Newburyport between 1830 and 1850 was marked, the town growing from 6,741 in the former year to 9,534 in the latter.

Today, tire fabrics are the only commodities made there that savor of textile production, the majority of the local manufacturing plants devoting their activities to shoes and boot and shoe findings, food products and paper boxes.

In 1830 Enoch S. Williams was producing combs in Newburyport, while a year later there were three comb shops in the town, and twenty in West Newbury.

THE ALBERT RUSSELL & SONS COMPANY

Albert Russell & Sons Company is the successor of a business established in 1840, when Messrs. Robert Russell and Eleazer R. Walker set up an iron foundry, under that name, the junior member of the firm withdrawing shortly afterwards, Albert Russell, who had assumed charge of production in 1854 continued the business until 1865, when his two sons, Edward P., and Albert were admitted to the firm which became known as the Newburyport Foundry & Machine Company, Albert Russell & Sons, Proprietors.

In 1857, James Blood, James M. Holmes and William W. Nichols established an iron foundry and machine shop, and operated until 1860 as

Holmes & Nichols, in which year Albert Russell bought the business and removed his foundry to the other plant.

Later, Albert Russell, Jr., withdrew from the original firm, and the father and Edward P. Russell operated the concern. Upon the death of Albert Russell, Sr., in 1889, the business was continued by Edward P., and when he died in 1893, William F. Runnells, his son-in-law, became manager. Ten years later, the corporation was formed under its present name—Albert Russell & Sons Company—and in 1906, Norman Russell, son of Edward P., became active in the executive end and a few years later was chosen president, Mr. Runnells continuing as treasurer, but the latter has not been active in the management since 1923, when he was named as postmaster of Newburyport.

During the early years of the concern, production was largely devoted to the manufacture of foundry work for the shipping trade, not only of New England, but of the United States, and Russell pumps, windlasses and capstans brought out at that time still remain standard products, and are marketed in large quantities. Subsequently a machine shop was added, and the foundry business was changed to general production.

About 1905 a bronze department was established, and since that time the company has specialized in bronze memorial tablets in which line the concern has attained a world-wide reputation for high quality products. Seventy-five hands are employed at present.

In 1853, Lucien A. Emery, Handel Brown and John Carr formed the firm of L. A. Emery & Co., and remodeled a brick factory building in the town, and began the manufacture of combs on a large scale, the structure being used for this purpose until 1898.

ADVENTURES IN SHOE MANUFACTURE

Among the local shoe manufacturers of the last half of the nineteenth century were John D. Pike, Horace Choate, Jacob T. Rowe, Elbridge K. Batchelder and Edward F. Tibbetts.

In 1866, Nathan D. Dodge and John H. Balch, under the firm name of Dodge & Balch began the manufacture of shoes, disposing of their business to Elisha P. Dodge and Joseph N. Danforth a year later, when N. D. Dodge removed to Troy, N. Y., returning in 1869, when, in company with his brother, William H. P. Dodge, he formed the firm of Nathan D. Dodge & Brother, and commenced the manufacture of women's boots and slippers. Two years later the partnership was dissolved, but the business was continued by N. D. Dodge, larger factories being occupied until 1890 when the Nathan D. Dodge & Son Company was organized, and later removed to Amesbury, where the firm was dissolved. In 1892 N. D. Dodge and Charles A. Bliss formed the N. D. Dodge & Bliss Co., which in 1899 leased the armory building.

Today, the Nathan D. Dodge Shoe Co. is capitalized for $500,000, employs 100 hands in the manufacture of women's McKay shoes, R. M. Baker being president, O. R. Widder, vice president, and Philip Meyer treasurer, of the corporation.

In 1867, Elisha P. Dodge and Joseph N. Danforth formed the firm of Dodge & Danforth, which was dissolved the following year, when John H. Balch established with Mr. Dodge, the concern known as E. P. Dodge & Co. In 1872 Mr. Balch withdrew and Mr. Dodge continued the business, erecting a brick factory, in 1873. Various changes in the firm took place between that time and 1889 when the E. P. Dodge Manufacturing Com-

pany was incorporated, the concern selling its business to the C. A. Ellis Company in 1902.

In 1871, William Noyes, Jr., and his son William H., began the production of combs, Robert Vine being admitted to the partnership of Noyes & Vine, which was dissolved in 1873, when William H. Noyes leased a shop, and later a larger building, and with his brother, Davis F., formed the firm of William H. Noyes & Co. This concern built a large factory in 1879. In 1884 the name was changed to William H. Noyes & Bro., and in 1899 to the W. H. Noyes & Bro. Company, when the concern was incorporated.

In 1904 the assets and machinery of Somerby C. Noyes & Co., of West Newbury, were purchased by the corporation and removed to Newburyport.

The concern operates today as the Noyes-Walton Comb Company, employs seventy-five operatives, and has capital of $45,000. Herbert S. Noyes is president, and H. Greenleaf Noyes, secretary and treasurer.

THE BLISS & PERRY COMPANY

The Bliss & Perry Company has been in active and continuous operation for thirty-eight years, having been originally incorporated as the N. D. Dodge and Bliss Company, in 1892. Fifteen years later, the name was changed to the Dodge, Bliss & Perry Co., and later in the same year (1907) to its present corporate name, but no material difference in personnel occurred in any of these changes. Messrs. Nathan D. Dodge and Charles A. Bliss were the original incorporators and shortly after the enterprise began. Walter I. Perry became associated with them in the management of the business. From early in its history up to the time of his death, on October 10, 1920, Charles A. Bliss was the treasurer and general manager. Upon his death George H. Bliss was chosen as treasurer, and Walter I. Perry, who had been president of the concern for a long time, was made general manager. In normal times the company's sales run from $1,000,000 to $1,500,000 annually and it has a payroll of approximately $350,000 to $400,000 per annum. Originally capitalized for $25,000, the amount has been increased until today it stands at $250,000. Many changes in plant location have been effected during the nearly two score years of the life of the concern, the last removal having been effected ten years ago.

Originally the company manufactured a comparatively inexpensive line of women's house and evening slippers but by continued effort on the part of the management the quality of the product was improved until at the present it makes as fine a line of women's turn shoes as is produced in Massachusetts or New England and in many of the high grade stores of the country its footwear sells on a par with Brooklyn-made turns.

Upwards of 400 employees are constantly carried on the payrolls, and the corporation has capital of $250,000. Walter I. Perry is president, George H. Bliss, treasurer, and Donald I. Perry, Herbert E. Harriman, and Norman P. Merrill, constitute the board of directors, with the president and treasurer.

In 1888, Harry D., and Chauncey W. Dodge, under the firm name of Dodge Bros., began the manufacture of shoes.

In 1891, Daniel S. Burley and William R. Usher began the production of shoes as Burley & Usher, the firm becoming Burley & Stevens, in 1899.

In 1898, the G. W. Richardson Company was incorporated with Henry B. Little as president and George W. Richardson, as treasurer, and engaged in comb manufacture.

THE HUSK AND LEARNED SHOE CONCERNS

In April, 1894, Harry M. Husk began in his individual name the manufacture of fine shoes for women, and the following March the Harry M. Husk Company was incorporated, with $200,000 capital and with Mr. Husk as president and treasurer, Avery G. Husk as vice president, and John M. Miles, as sales manager. In a few short years the concern has become the employer of 400 operatives, and takes rank as one of the fastest growing and most progressive shoe units in Newburyport.

The George A. Learned Company began as a partnership on September 1, 1906, the founders of the business being George A. Learned, Roger Sherman, Jr., and Andrew Roaf. Three years later the partnership was dissolved, and George A. Learned continued the manufacture of women's turned shoes as an individual, but under the present name, until January 1, 1923, when the business was incorporated, with Henry C. Learned as president, and George A. Learned as treasurer. The present capacity of the plant is 2,500 pairs a day, upwards of 350 operatives being employed.

In 1907, Patrick Tracy Jackson, IV, and others, bought the Victoria Mills, then owned by the Peabody Manufacturing Company, and converted them from a weaving to a yarn plant, under the name of the Warner Cotton Mills, which were organized with $300,000 capital.

SOME OF NEWBURYPORT'S PROMINENT INDUSTRIES

In June, 1919, the Three Line Counter Company was incorporated, with $100,000 capital, to manufacture fibre counters, and production has grown from a few thousand to upwards of 75,000 pairs per day, some seventy-five employees being carried on the payroll. The concern is a subsidiary of the Spaulding Fibre Company.

In 1928, Frank R. Briggs, well known Massachusetts manufacturer and a former president of the National Boot and Shoe Manufacturers Association, established a plant in the city for the production of shoes in the refined mode, the factory equipment being designed for concentration on advanced method flexible sole, wood heel type of footwear, with empasis on quality rather than quantity output.

The latest available statistics show that at the close of 1927 there were sixty manufacturing establishments in Newburyport, a gain of four over the previous year.

The Victor Manufacturing Company, owned by Henry T. Moody and Harold A. Besse, employs twenty-five operatives in the manufacture of fire doors, and is one of the city's growing and successful industrial units.

The Baby Shoe Company, owned by John S. Norton and Louis J. Festo, Jr., is engaged in the production of infants' soft sole shoes; the Brackett Heel Company manufactures heels, F. W. Kneeland being president, H. B. Trask, treasurer, and G. T. Gorwaiz, secretary of the corporation; The Chase-Shawmut Company, with capital of $300,000, employs upwards of 100 operatives in the manufacture of electric fuses and fittings, Sears B. Condit being president and treasurer, and Frank D. Masterson, vice president and manager; the Custom Heel Company manufactures wood heels and employs fifty operatives, J. F. Pollard being president and treasurer of the concern; the William G. Dodge Shoe Company employs 200 operatives in producing women's hand-made turn shoes, William G. Dodge being president and treasurer, Charles C. Arnold, vice president, and Peter I. Lawton, secretary of the corporation; The Fern Shoe Company manufactures women's turn shoes, and carries 175 to 200 operatives on its rolls,

Oscar Fern being president and treasurer, and Peter I. Lawton, secretary of the concern; The Fern & Poor Company employs 125 hands in producing women's shoes, George P. Poor being president and treasurer, and Benjamin F. Poor, secretary, of the concern; Edward A. Hale is engaged in the manufacture of paper boxes; the W. D. Hannah Shoe Company, owned by W. D. Hannah employs 300 operatives in the production of shoes; the Ernest D. Hazeltine Company is engaged in the manufacture of women's McKay shoes; the Ireland-Grafton Company, capitalized for $60,000, employs from 150 to 200 in producing women's McKay shoes, J. H. Ireland being president, and R. B. Ireland, secretary and treasurer of the corporation; the H. A. Johnson Company, of Boston, operates a branch plant in the city, engaged in the manufacture of bakers' and confectioners' supplies; the Lowell Thomas Shoe Corporation, with capital of $100,000, manufactures women's shoes, Harry B. Thomas being president, William P. Lowell, Jr., secretary, and William P. Lowell, Sr., treasurer of the concern; the Maple Wood Heel Company, capitalized for $60,000, employs fifty operatives in producing wood heels, Fred W. Mears being president and Halsey E. Abbey, treasurer; the Edward Perkins Lumber Company, with capital of $125,000, employs fifty hands in producing boxes and lumber; Irwin W. Tapley is engaged in the manufacture of wooden and paper boxes; the Warner Box Co., of Brockton, maintains one of its three units in Newburyport, and the R. E. Welch Shoe Company, owned by Richard E. Welch, employs seventy-five in the manufacture of shoes. The Dwight Manufacturing Company of Chicopee, operated a large unit in Newburyport, where cord tire fabrics were produced. In 1929 the Firestone Tire & Rubber Co. purchased this plant and began operating it day and night.

The total value of all products manufactured in these plants in 1927, was $12,931,366; the value of stock used in manufacture being $6,300,320, and the difference between these amounts ($6,631,046) representing the value added by the various manufacturing processes. Te average number of wage-earners employed during the year was 3,084, and the total amount paid in wages was $3,483,355.

The principal products manufactured in Newburyport in 1927 were boots and shoes, including boot and shoe cut stock and findings, the total value of which products combined, amounted to $7,906,662, or 61.1 per cent of the total value of all products manufactured in the city in that year. Other important products manufactured were silverware and tire fabrics.

CHAPTER XXIV

THE IMPORTANCE OF THE TOWNS OF ESSEX COUNTY IN THE INDUSTRIAL PICTURE

AUTOMOBILE BODIES SUPPLANT AMESBURY AND MERRIMAC BUGGIES

Jacob Perkins, of Newburyport, removed to Amesbury soon after 1790, and set up his machine for cutting and heading nails which he patented on January 16, 1795, and for a number of years carried on production locally, the invention having a reputed capacity of 200,000 nails a day. Machines in operation prior to 1798 were worked by water power. The nails fabricated by Perkins' machine were considered inferior to those imported from England and sold 20 per cent cheaper. In 1805 The Amesbury Nail Factory Company was incorporated, with $450,000 capital, but it subsequently became financially involved and failed.

Paul Moody, to whom Francis Cabot Lowell was indebted for the success of the Waltham cotton textile experiment, was born in Newbury, May 23, 1779, and when sixteen years of age learned the weaver's craft, at which he became expert. He then entered business with Jacob Perkins, of Amesbury, the inventor of the nail-cutting machine, and, in 1812, was in the employ of Kendrick & Worthen, manufacturers of carding machinery.

On February 13, 1813, he became one of the incorporators of the Amesbury Wool and Cotton Manufacturing Company, which was capitalized for $46,000, and which began the production of satinets, a popular mixture of wool and cotton. Ezra Worthen, Thomas Boardman and Samuel Wigglesworth were associated with him in the venture.

The next year he went to Waltham, where he found full vent for his inventive and organizing ability. One of Moody's less known discoveries was that of the economic value of leather belting, which later was generally used in mill drives.

No more striking example of the ability of Massachusetts manufacturers to adapt themselves to changing economic conditions is afforded than in the transformation that has been observed in Merrimac and Amesbury, where, up to thirty years ago, more highway vehicles were constructed than in any other two towns of comparable size in the United States.

Nor was it in volume of production alone that these two municipalities excelled. The quality of carriages and sleighs manufactured was so high that the two towns for decades enjoyed the reputation of turning out the world's best products, and before the advent of the automobile no owner of blooded horses considered his equipment complete unless it included Merrimac or Amesbury vehicles.

When the former town definitely turned from ship-building, which industry for decades constituted its primary source of wealth, the manufacture of earthenware, the treatment of hides by tanning and the production of felt boots and shoes were undertaken, the latter industry attaining at one period a record of 12,000 cases a year, valued at $150,000. At that time it comprised its major manufacturing activities, but as early as

1838 there was commenced within its borders the production of vehicles, and in the forties two more concerns were established in that line, while during the fifties four others began the manufacture of carriages and sleighs. Four new companies were formed between 1861 and 1868, and four more were started in the seventies, and during the years between 1881 and 1884 four more were added.

By 1888 there were nineteen carriage and sleigh manufacturing concerns operating in Merrimac, giving employment to about 500 men, and there were produced that year 3,395 vehicles of all kinds, including coaches, landaus, coupes, sleighs, buggies, road wagons, and the like, which were valued at $868,000.

In 1892 there were forty-four going carriage concerns in Amesbury, but when 1900 rolled around there were but six local companies still manufacturing horse-drawn vehicles, with as many more that even at that early period of the motor car had turned to the production of auto bodies.

Today, there is but one of the original forty-four carriage-making units operating in Amesbury—the Biddle & Smart Company, which, with one other concern, formed since the advent of automobiles, completes the present day list of local active motor car body builders. Yet it is significant that the total annual sales of these two companies are many times greater than those that prevailed in the days when Amesbury was building buggies, carryalls, phaetons and other horse-drawn vehicles.

There were not less than fifteen Merrimac vehicle builders between 1838 and 1888, a period of fifty years, bearing the name of Sargent, while the Baileys were also prominent in the trade. The J. B. Judkins Company, today taking rank as builders of high-class automobile bodies, is the only Merrimac concern still operating under its original name, having been established in 1857—almost three-quarters of a century ago.

To Michael Emery, of West Newbury, who learned his trade in Newburyport, may be traced the supremacy of Merrimac and Amesbury in the building of carriages and sleighs, and it is interesting to note the transfer of an industry from one locality to another. Emery and others who followed him carried on their production in Newbury and Newburyport until these two towns were considerably engaged in the manufacture of vehicles, but it gradually drifted to Merrimac and Amesbury, and finally disappeared entirely from the Newburys.

In 1800 Emery located at Amesbury and eighty years later 1,600 carriages were produced in a single twelve months in that town, valued at $372,500, and 250 men were locally employed in the industry. In 1886 Amesbury had thirty carriage-building establishments, and one firm alone put on the market that year 2,018 vehicles, another 1,200, while the production of many others reached several hundred each. The first application of machinery to the manufacture of carriage gears was made there by John S. Foster, who, for several years was connected with the West Amesbury Manufacturing Company. Subsequently between 4,000 and 5,000 sets of wheels were made annually by this concern.

THE BIDDLE & SMART COMPANY

That no critic is justified in asserting that a decline in industry has taken place in either Amesbury or Merrimac, simply because the leading industry of the two towns has become auto-body building in lieu of the former production of carriages is attested by the fact that in the day of their greatest activity the vehicle manufacturing concerns of Merrimac employed not more than 500 men, while today three auto-building units in

the same town require the services of upwards of 1,000 employees in the busy seasons. In Amesbury the figures are even more significant, the Biddle & Smart Company alone employing upwards of 2,500 hands in turning out bodies for the Hudson and Essex motor cars.

Founded in 1869, and now more than sixty years old, the Biddle & Smart concern has always been one of Amesbury's consistently prosperous industries. From its inception it has been a private enterprise, the control and management having rested in the Biddle family, while during the past twenty years members of that family have been the sole owners. For ten years past the concern has built exclusively for the Hudson Motor Car Company, which fact has led to the belief in some quarters that it is partially owned by the motor car company, but, as a matter of fact, the Hudson unit does not control a share of stock in the Amesbury concern. The designing and engineering departments of both units, however, pool their efforts in a close coördination of effort.

For several years past the annual sales of the Biddle & Smart Company have averaged over $12,000,000 and upwards of 40,000 bodies are turned out every twelve months—figures which are so infinitely greater than those applying to the horse-drawn vehicle production of thirty or forty years ago as to make the latter pale into insignificance.

In 1928, for the first time in its long career, the Amesbury concern received substantial orders for bodies for Essex roadsters.

The previous year hundreds of thousands of dollars worth of new equipment was installed in the plant, including conveyor systems and up-to-date paint spraying methods. The mechanical end is thoroughly modern in every respect. Upwards of 1,000,000 square feet of floor space are utilized in the busy season, the manufacturing layout including a complete brass foundry and machine shop, modern wood-working plants, blacksmith and metal-stamping shops equipped with the latest type of heavy and light presses, and complete body assembly, upholstery and painting departments. The weekly payroll runs from $65,000 to $100,000 according to the rate of production and the company takes rank as the largest individual user of sheet aluminum for motor car bodies in the United States, its annual consumption being approximately 3,000,000 pounds.

In 1929, following the incorporation of the Auto-Hydro-Craft, Inc., with capital of $250,000, contracts were entered into between the officers of that corporation and those of the Biddle & Smart Company, whereby the latter concern undertook the construction of the metal bodies for the motor boat concern. Production was started in June, of that year, and the officials of Auto-Hydro-Craft, Inc., announced that the reasons they established the enterprise in Massachusetts were the success of the Amesbury concern, during the past twenty years in turning out by mass production methods as high as forty thousand automobile bodies each year; the fact that the Amesbury corporation had available upwards of one million square feet of manufacturing space, some of which could be devoted to the needs of the motor boat unit, and its mechanical, engineering and designing facilities all of which could be taken advantage of by the new corporation. The Biddle & Smart Company has capital of $350,000. William E. Biddle is president and general manager, Evan J. Parker first vice president, Leander G. Yeaton second vice president, and Theodore Torrey, secretary and treasurer.

The prosperity of New England cities and towns is more closely allied with world-wide distribution products than the trade-mark of such goods indicates.

We are prone to think of automobiles as smacking of Detroit and while the final assembly is in that city and shipment is made all over the world from that point, yet the units which go to make up the finished product have their origin frequently in New England. As a result, activity in the automobile business means activity in the manufacturing centers of Massachusetts. When the plants in Detroit begin operations, the wheels of industries of our cities and towns start to hum in response to the demand for those things which Massachusetts is able to produce in better quality than any other section of the country.

Millions of dollars flow annually into Amesbury, Merrimac, Worcester, Easton, Quincy, Boston, Lawrence, Franklin, Milford, Orange, Springfield, Natick, Watertown, Holyoke, Chicopee, Cambridge, Fitchburg, Framingham, Reading, Brockton, North Brookfield, East Weymouth, Athol, Lowell, North Adams, Whitman, Stoughton, Fall River, New Bedford, and other New England cities and towns through the orders from automobile concerns. Merchants and tradesmen of all kinds immediately feel the effect of any slowing down, not only in Amesbury, but in the surrounding towns of Newburyport, Merrimac and Haverhill where thousands of the Biddle & Smart and Judkins workers, and the employees of other automotive producing concerns reside.

Worcester has been the center of small motor parts manufacture for thirty years and the products from that city are shipped to the value of millions each year to go into the making up of automobiles manufactured in the Middle West.

THE MERRIMAC HAT CORPORATION

For not less than 150 years hats have been produced in the vicinity of Amesbury. In 1780, Elder Moses Chase was reported to be engaged in making belltop beavers, when he was not occupied in preaching the Gospel. He was followed by others, who created the style known as the "Martinique," and exported them to the West Indies. In 1852, Alfred Bailey, who later became the historian of Amesbury, built a hat shop adjacent to the pond from which the present Merrimac Hat Corporation secures its water supply. He sold the factory the following year to Abner L. Bayley, as an annex to the latter's hat business. It was fitted with wool cards, said to have been among the first operated in the United States.

In 1856 the Merrimac Hat Company was incorporated, with Joseph Merrill, as president, and Abner L. Bayley as treasurer and agent, the latter holding 45 of the 130 shares, the original capital being $13,000. Bayley was paid a salary of $800 per year, which was increased to $1,000 in 1860. That year, Hiram Lowell was chosen president of the concern.

The company appears to have prospered from the start, a dividend of 6% being declared, on August 5, 1857, and eighteen months later the stockholders received a 20% stock dividend. In 1861, another of 33⅓% was paid, one 25% in 1862, in which year Bayley's salary was increased to $1,500.

In 1862, the Amesbury Hat Company, a local rival, was consolidated with the Merrimac unit, and shortly afterwards the 50% dividend of surplus profits was declared. In 1866 the Horton Hat Company of Amesbury, founded by Daniel Horton and W. A. Little, of Newburyport, was absorbed by the Merrimac Hat Company. When Mr. Bayley died in 1870, he was followed as treasurer and agent by John Cowdin. Succeeding treasurers have been J. Howard Sweet, Robert B. Hawley, William Martin, Otto Kranz and John H. Wyeth. In 1872, the old mill on the wharf was burned,

and six years later a modern brick factory was erected on the present site, this location being chosen largely on account of the plentiful and easily accessible supply of pure, soft water.

In 1909 a substantial addition was made to the plant and a year or two later a large concrete storehouse was built.

In 1909 the company was reorganized and refinanced as the Merrimac Hat Corporation, and the following year the business of the Ayer Houston Corporation, of Portland, Me., was purchased and was sold in 1926. In the latter year the long established business of Wm. Knowlton & Sons Company, of West Upton, was bought, and that plant is operated by the Merrimac unit.

Capitalized for $1,000,000, it employs 1,100 operatives, does an annual business of more than $4,000,000 a year, and is the largest wool hat manufacturing concern in the United States.

The growth under its present management has been remarkable and it has contributed to the prosperity and uplift of the town of Amesbury, as well as adjoining municipalities.

Benjamin F. Sargent, Jr., is president, John H. Wyeth treasurer, Henry R. Guild secretary, and Stephen Terry, vice president, of the corporation.

HIRAM LOWELL & SON

Since 1800, without interruption, there has been carried on in Amesbury, by six generations of the Lowell family, the manufacture of dories, and singularly enough all production has been executed at the same location where Fred A. and Walter E. Lowell now produce trawl, handline and bluefish dories, pleasure and rowboats, tenders and outboard motor craft and skiffs. The present firm succeeded Fred E. Lowell, who followed Hiram Lowell. The latter's father and grandfather before him were boat builders at the 435 Main Street factory. The present plant was erected by Hiram Lowell, but was greatly enlarged during the management of Fred A. Lowell, and the shop has a continuous record of steady all-the-year-round work for between fifteen and twenty men. The maximum production in any year has reached 2,300, and in recent times, when the demand for dories tapered off, about 1,000 such craft have been turned out each twelve months. The distribution of the firm's products is wide, thousands being used in Alaska, at Seattle and on the West Coast, as well as in the Gulf of Mexico, and along the Atlantic seaboard. The dory has been adopted by the United States Coast Guard and by the destroyer patrol, and every station from Maine to Florida is equipped with dories made by the Amesbury concern. During that period in the history of this country when the hand fisherman and the dory were a part of the backbone of the nation, the Lowell firm could scarcely keep up with its orders, but as fishing methods changed the market for dories in recent years has been largely for Coast Guard use, for the barges of the Standard Oil Companies, for shore fishermen and for various commercial uses. The firm now finds its facilities being taken advantage of by pleasure boat customers, and particularly in the outboard motor field.

F. M. HOYT & COMPANY

The twentieth century has witnessed the rise and growth of innumerable manufacturing enterprises in this Commonwealth, but few have a more romantic origin than F. M. Hoyt & Co.

In 1901, Frank M. Hoyt was obsessed with the idea that the manufacture of peanut butter offered promise of success, but like many another entrepreneur he lacked the necessary capital to start operations. A friend who knew of his ambitions came to Mr. Hoyt's office, and throwing a check for $400 on his desk, said it could be paid whenever convenient. Some months later, this financial angel met Mr. Hoyt and asked if it would be possible for the latter to pay the money he owed, and receiving an affirmative reply admitted that he didn't want the money, but simply desired to learn whether it could be had when needed. Some months later the account was liquidated, as Mr. Hoyt had fully established his credit at his local bank.

With the limited capital available, Mr. Hoyt began his experiments by purchasing a bag of peanuts and placing them in his kitchen stove to roast, and here he came in contact with his first hurdle. He had no equipment capable of removing the skins from the peanuts, but after a series of experiments he evolved a cracking device which split the nuts in halves, and in the loft of a barn on the outskirts of Amesbury, Mr. Hoyt found a winnower, to which he applied his muscle, with the result that the skins of the peanuts were blown away by this device. Peanut butter had not long been on the market at that period, and it was a difficult problem to find a satisfactory grinder, but finally Mr. Hoyt found an old grinding mill, which he operated by hand, and by pushing the peanuts through with a stick, and repeating the process two or three times, he finally succeeded in turning out butter. With a sample of his product, he called on a firm in Lynn and received an order for 200 pounds, a quantity so large that he concluded it would be wise for him to return to Amesbury and proceed to manufacture the butter. After a struggle, he loaded five forty-pound pails of butter in a freight car and shipped the order to Lynn, receiving a duplicate order a week later. Today Mr. Hoyt points out with a degree of pride that this initial customer has never left him, and that he serves the Lynn concern and the next three customers to whom he sold his output in the experimental stages of production.

Soon after Mr. Hoyt purchased half a carload of peanuts, and he recalls how large that supply looked to him as it was unloaded, but it was infinitesimal compared to his present day deliveries, as it frequently happens that he has on hand from twenty-five to thirty full carloads of peanuts, and he has often placed orders in the intervening years for seventy-five carloads of shelled peanuts.

Removing to a loft outside of the manufacturing section of Amesbury, Mr. Hoyt was confronted with the problem of bringing power to his plant, which he met by paying for the cost of running and installing an electric line to his factory. Later followed salted nuts, peanut butter kisses, and other nut confections, and ultimately a removal to the present factory, with a capacity of utilizing a carload of peanuts each day. From one employee the concern has grown until seventy-five are carried on the payroll.

THE AMESBURY BRASS & FOUNDRY COMPANY

In 1906, Robert H. Hills and William E. Biddle, as co-partners, established the Amesbury Brass & Foundry Company, with original capital of $10,000, and built the first unit of the concern at its present location, on Water Street. At that time ten men constituted the working force, which

has grown in the intervening years to 250 employees. In 1924 the concern was incorporated under the laws of this commonwealth, and the plant has been extended until today upwards of 50,000 square feet of floor area are used in the manufacture of automobile body hardware, brass, bronze and aluminum castings. The ownership has been unchanged during these twenty-four years.

THE AGA AUTO LAMP COMPANY

In 1922 the Aga Auto Lamp Company, Inc., was organized and took over the lamp division of Gray & Davis, Inc., a concern that began business some thirty-five years ago during the days of horse-drawn vehicles, and which manufactured lamps for hacks, phaetons, landaus, and other types of carriages. With the advent of the automobile the Gray & Davis concern became one of the largest and most prominent producers of automobile lamps and accessories, as well as one of the pioneers in that field. and in 1922, when the Amesbury plant was closed, the Aga Auto Lamp Company purchased it, and immediately began the development of a new line of automobile headlights and special equipment, later adding chromium plating, steel stamping, enameling and machine shop work.

Marks Angel is president, E. C. Amidon vice president, and M. L. Gordon treasurer and secretary, of this progressive corporation.

Today Amesbury has a diversified industrial production which includes automobile lamps, automobile bodies, abrasives, brass, bronze and aluminum castings, automobile hardware, women's shoes, automobile accessories, food products, boats, straw and felt hats, metal and wood working machinery, foundry and machine shop products and automobile cushions, springs and backs.

Prominent among the other manufacturing establishments of the town are the American Abrasive Company, capitalized at $300,000, producing abrasives; the Steel Shot & Grit Company, capitalized at $50,000, manufacturing steel shot and diamond grit, of which G. H. Kann is president, I. A. Diamondstone secretary, and H. M. Ream treasurer; A. J. Anderson, Inc., of which concern A. J. Anderson is president and treasurer, Ray Jackson vice president, and R. J. Miller clerk, captalized for $30,000, and employing 300 workers in the production of women's shoes; the Bailey Manufacturing Company, owned by E. W. M. and S. R. Bailey, employing thirty in the production of automobile accessories; the Haverhill Gas Light Company, with capital of $982,800, employing 210 in the production and marketing of water gas; the Commonwealth Supply Company, with capital of $35,000, employing twenty-five hands in the manufacture of fibre and counter board, C. D. Parker being president, Bowen Tufts vice president, and A. T. Stanwood treasurer; the Fashion Wood Heel Company, employing fifty hands in the production of wood heels, R. Goldbaum being president, and John Kessler treasurer and secretary; the Harry Sons Shoe Company, owned by Annie Kessler, and employing 200 in the manufacture of women's McKay shoes; the Marks-Chandler Company, formerly the Irvington Shoe Company, employing seventy-five in the manufacture of women's turn and novelty shoes; the G. W. J. Murphy Company, with capital of $90,000, producing auto curtain fasteners and accessories; the Pettingell Machine Company, owned by the estate of A. G. Bela, employing thirty-five in the manufacture of machinery; the Powow Manufacturing Company, of which William J. Greaney is president, Thomas O'Brien vice president, Clifford R. Carter treasurer, and John J. O'Brien,

Jr., secretary, carrying on foundry and machine shop work; the Walker Body Company, with capital of $500,000, employing in its Amesbury and Merrimac plants 700 workers, in the production of automobile bodies, T. H. Walker being president, John J. O'Brien, Jr., vice president, Clifford R. Carter treasurer, and E. H. Wilson secretary, of the corporation; and The Charles Wing Company, capitalized for $60,000, of which William W. Hawkes is president and treasurer, and Harry W. Steere is secretary, this unit being engaged in the manufacture of automobile upholstery, cushions, backs and springs.

In 1927 Amesbury's manufacturing concerns used stock and materials valued at $11,133,906, employed 4,257 workers, to whom were paid $5,968,800 in wages, and manufactured products valued at $19,772,024, a total larger than that representing Gloucester's 1927 production value.

ANDOVER

At a privilege on the Shawsheen River, in Andover, was located as early as 1775 one of the first powder-mills, perhaps the very first, established on the soil of Massachusetts. Built in 1775-76, by Hon. Samuel Phillips, whose proposal to the General Court to construct and operate, with certain encouragement from the commonwealth, a mill at his own expense, met with approval, and production of powder was there begun in March of the latter year. Operations continued, with profit to him, for more than twenty years thereafter, but the local unpopularity of the enterprise, due to frequent explosions, and the loss of life in June, 1778, and October, 1796, led to its discontinuance in the latter year.

Early in 1789 Thomas Houghton, a paper manufacturer from England, contracted with Mr. Phillips for the use of a portion of the plant for the manufacture of paper, and an additional unit was erected, the industry remaining fairly prosperous until 1821.

In 1807, Abraham Marland, who was engaged in manufacturing cotton yarns for knitting and weaving at Lynnfield, removed to Abbot Village, and built a small mill, 15 by 40, two stories high, where he conducted the business of the Abraham Marland Cotton Factory up to 1811, changing his carding and spinning machinery that year to produce woolen yarns, adding looms upon which he wove satinets, and turning out army blankets during the War of 1812. From 1813 to 1819 he was interested in the mill established by James Scholfield, in North Andover. In 1821 he leased the old powder mill erected in 1775-76, at Andover, by Samuel Phillips, Jr., which was transformed into a paper plant in 1789, and Marland erected on the site the first brick unit—the oldest of the present Marland Mills, as well as a block of brick tenements for his employees. In 1822 Mr. Marland purchased the mill privileges on both sides of the river, the woolen unit built that year, the old paper plant, a grist mill, and thirty acres of land. He erected a new building in 1832, and two years later incorporated the Marland Manufacturing Company, with $60,000 capital, becoming president of the corporation, a position he held until his death, in 1849. Operations were continued by the company for thirty years thereafter and on July 2, 1879, the mills were sold to Moses T. Stevens, who thoroughly modernized the existing structures, erected new buildings, and equipped the plant with new machinery. Today the Marland Mills constitute one of the important units of M. T. Stevens & Sons Company.

It is a far cry from the primitive plants established in 1671 by Joseph Parker and Stephen Johnson, who dammed the Cochichewick River that

year, to the twentieth century plants of the M. T. Stevens & Sons Company, located in Andover, North Andover, Haverhill, and Dracut, and in Franklin, N. H., and Peace Dale, R. I.

Nathaniel Stevens, born in North Andover in 1786, was the first to introduce American-made flannels into the market, and in 1813 he established the original unit of the present group of mills, capitalized at upwards of $1,000,000.

His contribution to the industrial prowess of Massachusetts was perhaps as great as that of any other man who followed manufacturing in this state. Five sons were born to him and all became identified with manufacturing in Massachusetts, and not only Andover, North Andover, Haverhill and Dracut have profited by their ventures, but the growth and prosperity of the towns of Ware and Dudley, in this state, and of Franklin, N. H., and Peace Dale, R. I., are traceable to the manufacturing activities of these scions of an industrial leader.

Charles A. Stevens located at Ware and established a large woolen unit; Harry H. Stevens became identified with the manufacturing activities of Dudley, where he set up the Stevens Linen Works, now the largest industrial unit in that town, capitalized at $1,050,000, employing 500 hands, and where a big addition erected in 1927 is in operation, comprising the only sizable linen crash concern carrying on business in Massachusetts; Moses T. Stevens was the genius who presided over the destinies of the M. T. Stevens & Sons Company, which is capitalized at $4,000,000, and employs 2,000 hands in its several Essex County plants, while George and Horace W. Stevens were connected during their active years with the company founded by their distinguished father.

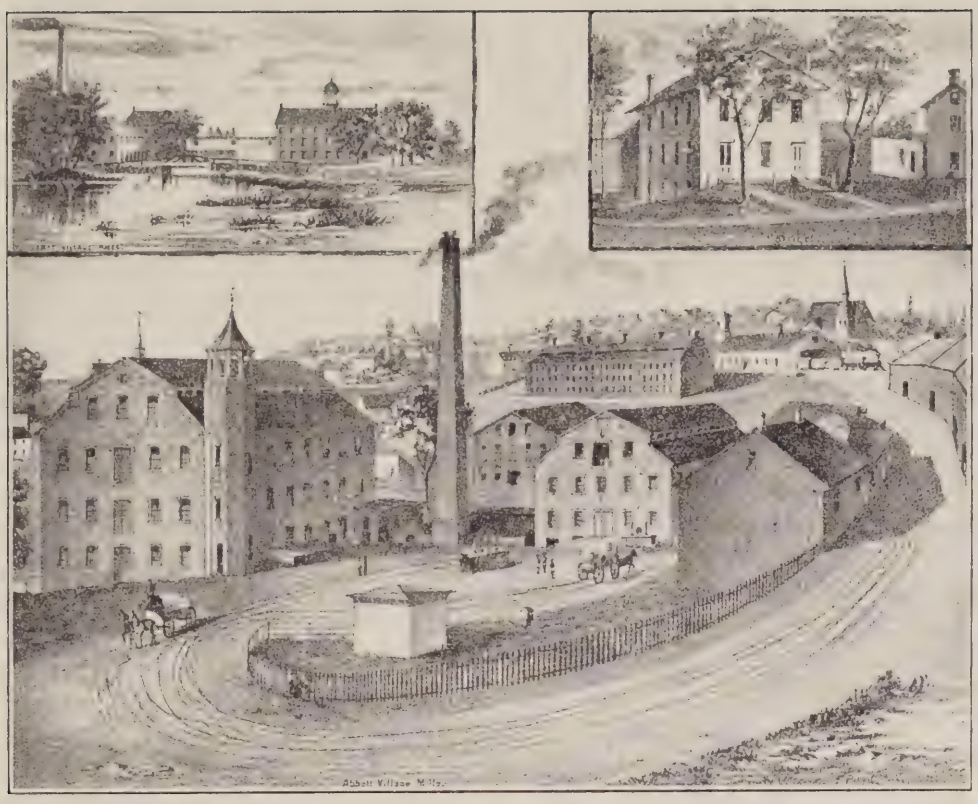
Today the control of the parent concern is lodged in their descendants —Nathaniel, Moses T., Abbot, John P., and S. D. Stevens—all being active on the directorates of the M. T. Stevens & Sons Company, and the Stevens Linen Works.

In 1854, the Haverhill unit was established, and in 1913, the Andover Mill property, originally owned by Governor Bradstreet, was bought, and the manufacture of woolen fabrics was started there, flannels being added to the line five years later.

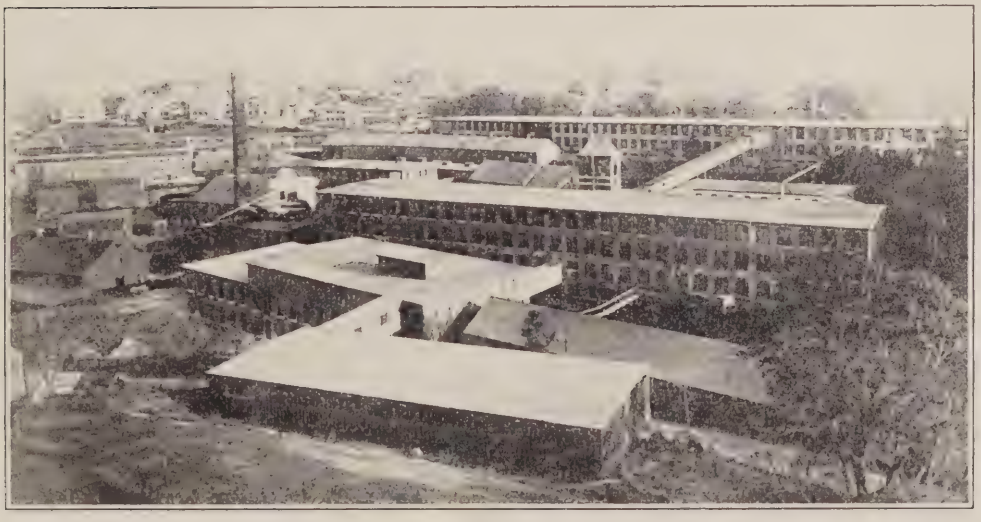
It is clearly evident that no "dry rot" has seeped into this concern, now almost 120 years old, and that the present management is as alert as were the founders to take advantage of opportunities offered in Massachusetts, for, in 1928, the corporation executives purchased the plant of the Merrimack Woolen Mills, in Dracut, and immediately began the manufacture there of overcoatings and other textile products. Altogether seven large plants are operated by the corporation—the Stevens and Osgood Mills, in North Andover; the Marland Mills, in Andover; the Pentucket Mills, in Haverhill; the Merrimack Woolen Mills, in Dracut; the Franklin Mills, in Franklin, N. H., and the Peace Dale Mills, in Peace Dale, R. I. Nathaniel Stevens is president, M. T. Stevens secretary, Abbot Stevens treasurer, and they, with S. D. and J. P. Stevens and Carl Vedder, constitute the board of directors of M. T. Stevens & Sons Co.

FOUNDERS OF AMERICA'S FIRST FLAX MILL

The industrialist of 1930 often feels that he faces insuperable obstacles in his attempt to establish an infant industry, but his task, formidable though it may be in these days of keen competition, is a sinecure com-



SMITH & DOVE MANUFACTURING COMPANY, ANDOVER
Upper left: Original Plant on its site in Frye Village, now Shawsheen Village
Upper right: The original office. Lower: The plant at Andover, about 1880



PRESENT PLANT OF THE SMITH & DOVE MANUFACTURING COMPANY, ANDOVER

pared to the conditions that faced John and Peter Smith and John Dove when, in 1835, they set out to manufacture products from flax fibre.

The sales resistance in this, the second quarter of the twentieth century, can scarcely be greater than that met by these Andover entrepreneurs, who, when they sought to market their first consignment of shoe thread, encountered the factor of rank prejudice in favor of the imported article at the hands of both merchant and consumer. For eight long and weary years only their Scottish tenacity, their bull-dog courage and their honest conviction that they were producing a commodity equal to the imported article, served to give them the courage to win against terrific odds.

In 1796, John Smith was born in Brechin, Scotland, and when twenty years of age came to the United States, and labored as a machinist, in Medway. Six years later he removed to Plymouth, where he organized and established the firm of John Smith & Co., to engage in the manufacture of cotton mill machinery. The concern was successful, but, in 1824, in order that it might be located nearer what at that period was the center of the textile industry, he decided to remove the business to Andover.

In his employ were his brother, Peter Smith, and John Dove, also natives of Brechin, Scotland, and ten years after removing to Andover, these two employees, who had worked side by side as boys in the flax mills in their native heath, determined to discontinue their connection with the cotton machinery concern, and establish a company for the manufacture of cotton chalk lines, Mr. Dove having invented a machine designed for that type of production.

Seeking the financial assistance of John Smith, they were induced by him to modify their plans, and the trio inclined to the belief that there existed in America a field for the manufacture of products from flax fibre.

Mr. Dove was sent to Scotland to obtain drawings of flax spinning machinery, and in a few months he returned to Andover, where the devices were built in John Smith & Co.'s machine shop.

At that period a brick mill, on the west side of the Shawsheen River, at Frye Village, in Andover, established in 1814, by Abel and Paschal Abbott, and another mill that had been operated by John Howarth & Co., until 1837, when that concern failed, were purchased, and here the new flax machinery was installed, and, in 1835, Smith, Dove & Co. began the first manufacture of flax products by machinery in America, the products including flax yarns for carpet weaving, sail twines, shoe threads, and other commodities of similar character.

At that period all of this material was being imported, chiefly from Great Britain, and when Peter Smith traveled by stage coach the twenty-five miles lying between Andover and Boston, with the first thirteen pounds of shoe thread turned out at the plant, he was discouraged to note the reluctance to purchase his goods and the bitter prejudice evident on every hand when he displayed his products. Almost a decade elapsed before a market could be developed sufficient to take care of the productive capacity of the Andover mill, but John and Peter Smith and John Dove hung on grimly, schooling themselves in adversity to meet the difficulties they encountered in planting a new industry in a new country. To them obstacles were not permanently discouraging and such slight diversity of opinion as they held simply seemed to increase the sum total of their wisdom. Their tried and unimpeachable integrity, the quality of their

products, their optimism and courage, ultimately won over the sentimental prejudices of the trade.

John Smith by nature was a skillful financier, a sagacious and far-seeing executive; Peter Smith possessed a talent and positive genius in the management of men, while John Dove was an inventor of unusual talent and ability, and they stood as a cord of triple strand, which, bound together, made a cable of rare strength.

Under their vigorous management the business developed rapidly in the '40s, and many inventions by one or another of the partners added greatly to the efficiency of the enterprise. In 1843 the plant was increased by the purchase of the mills at Abbot Village, in Andover, and production was greatly augmented. In 1864 the concern was incorporated as the Smith & Dove Manufacturing Company, which name it bears today, and that year Joseph W., son of John Smith; James B., son of Peter Smith, and George W., son of John Dove, entered the company. Later the Frye Village mill was discontinued and all operations were concentrated at Abbot Village in a typically modern plant. The original proprietors and their sons have long since gone to their reward, and today George F. Smith, a grandson of John Smith, is at the head of the corporation.

At the time of its inception, and for many years thereafter, it was without domestic competition in its peculiar field, there being no concern nearer than England that could supply the American market with flax yarns for carpet weavers, sail twines, shoe threads, and collateral products.

In 1928 the company was absorbed by the Ludlow Manufacturing Associates, of Ludlow, and now operates as the Smith & Dove Manufacturing Company, unit of the Ludlow Sales Corporation, whose headquarters are in Boston. No change was made in the management of the Andover units, George F. Smith remaining as president, and H. A. Bodwell as treasurer. Upwards of 750 employees are carried on the company's payroll.

THE BALLARD VALE MILLS COMPANY

In 1836 the Ballard Vale Manufacturing Company was incorporated, and today, lacking but half a dozen years of a century of existence, its successor, the Ballard Vale Mills Company, incorporated in 1905, has capital of $225,000, is equipped with thirteen sets of cards, 130 broad looms, 9,000 worsted spindles, three boilers, and three water wheels, and finds a ready market for its fine white flannels, which have constituted the product of the concern since its beginnings. Philip R. French is president, and Philip R. French, Jr., treasurer.

FOR ALMOST SEVENTY-FIVE YEARS ANDOVER HAS PRODUCED RUBBER GOODS

In 1856 Henry G. Tyer, then residing in Ballard Vale, experimented with rubber and its treatment, and finally succeeded in compounding ingredients that mixed with it to lasting advantage. Starting the manufacture of rubber cement in a small way, in what had been the local shops of the B. & M. R. R. Company, he later turned to rubber shoes, which he marketed under the trade name of "Compo," and which became so popular that ere long his factory was locally known as the "Compo Shop."

In 1876 the business was incorporated as the Tyer Rubber Company, and it was about that period that Mr. Tyer invented a process of compounding rubber with zinc oxide, which proved to be one of the outstanding steps in its manufacture, and not only of importance to the local industry, but to the entire rubber trade.

It was a material factor in the production of water bottles and syringes in the early days, and while the process since has been changed, it is interesting to note that the first great step toward the perfection of today was made at the Andover plant.

With this improvement came an enlargement of the local business and the establishment of new lines. Druggists' sundries were added, and, from that day to this, Tyer products have been the standard of the country. Mr. Tyer was the inventor of white rubber, now so generally used, and on which process he secured a patent. He was also the inventor and patentee of the Congress arctic, and of the double-texture goring used in that type of footwear.

Henry G. Tyer died in 1886, and his son, Horace H., became president, continuing at the head of the firm until his death in 1907.

The company entered a new line in 1909 with the inauguration of a department for the manufacture of auto tires and inner tubes, but this type of production was abandoned in 1922, when it was found necessary to devote the entire plant equipment to the expansion of the footwear department, which had grown beyond all expectations, and to the further development of other departments, which were proving of vast importance to the company.

In 1922 Myron H. Clark was chosen president, Henry G. Tyer vice president, Walter E. Piper treasurer, and George L. Lawrence factory manager.

The present officers are: President, S. W. Bartlett; vice president, Henry G. Tyer; treasurer, Walter E. Piper; clerk, G. L. Lawrence, Jr., and the concern has capital of $1,000,000.

The corporation uses 700,000 pounds of crude rubber each year, as well as a half million yards of cotton and woolen cloth, and it makes rubbers, galoshes and rubber boots for more than a million people; a quarter of a million hot water bottles each year and furnishes 2,500,000 feet of piano tubing for one company annually. It is the largest collapsible tobacco pouch manufacturer in the world; produces 12,000 pounds of rubber bands annually for the U. S. Post Office Department, and manufactures an almost endless line of goods.

Between 500 and 600 employees are carried on the payroll, and the present plant has 233,000 square feet of floor space.

While the town of Andover is the habitat of what undoubtedly constitutes the greatest textile development of all time—the new plants of the American Woolen Company—it seems best to carry the history of this gigantic and outstanding woolen and worsted enterprise in the chapter devoted to the industries of Boston, inasmuch as the main headquarters and offices of the corporation are located there. The further fact that numerous plants of the corporation are dotted throughout Massachusetts cities and towns justifies the policy of concentrating the story in a composite whole, rather than attempting to spread it through several chapters. Brief references, however, are made to the presence of plants of the American Woolen Co., in the stories of the manufactures of cities and towns where units are operated today.

OTHER INDUSTRIES IN ANDOVER

The Beaver Manufacturing Company, of which Philip R. French is president, C. B. French vice president and G. W. French, Jr., treasurer, produces chemicals.

The Merrimack Card Clothing Company, with capital of $50,000, is engaged in the manufacture of cards and napper clothing, Frederick H. Jones being president, Henry D. Rockwell treasurer and Julius Rockwell clerk of the corporation.

J. W. Barnard & Son, owned by Henry W. Barnard, manufactures women's shoes and employs twenty-five operatives.

Andover's fourteen manufacturing establishments had aggregate capital of $13,965,760, in 1927, used stock and materials valued at $7,952,820, afforded employment to 2,176 men and women, to whom were paid that year $2,587,662 in wages, and turned out manufactured goods valued at $13,664,803, a total greater than that represented by the value of the industries of the Essex County cities of Beverly and Newburyport.

The manufacture of iron fabricated from ore taken from the ponds supplied by the headwaters of the Rowley and Parker rivers was begun in the town of Boxford in 1680, and a bloomery was set up in the South Parish toward the close of the seventeenth century.

DANVERS

Probably the oldest shoe factory now standing in the United States is the Putnam Shop, near the Newburyport turnpike, in Danvers. It was built prior to the Revolution, and is mentioned in the first census of manufactures, taken in 1786, at which time it appears to have been a factory of importance. The shoes produced there were all made by hand.

Amos Trask manufactured chocolate and ground cocoa at his home below the Bell Tavern as early as 1771, according to an announcement in the *Essex Gazette*, this being about six years subsequent to the Baker experiments at Dorchester.

Crude cocoa was being brought to America at that period by the Gloucester fishermen, who accepted it in exchange for fish, which they shipped to the West Indies and Central and South America.

In 1847 the Danvers Bleachery & Dye Works were established by Elijah Upton and T. W. Walker. The plant is now owned and operated by the Naumkeag Steam Cotton Company, of Salem, has a capacity of 150 tons a week, is equipped with fifteen dyeing machines, and employs 1,000 operatives.

In 1854 the town possessed thirty-five firms, large and small, turning out 1,500,000 pairs of shoes annually, and with 2,500 employees in the industry.

Other than the manufacture of bricks the shoe concerns constituted the entire industrial life of the town at that period.

Today Danvers is the seat of more than a score of manufacturing units whose products include toys, games, shoe manufacturers' supplies, builders' finish, incandescent lamps, calf and other leathers, electrical specialties, shoes, moccasins, men's shirts, crayons, slippers, cotton piece goods, finishing and tanning concerns.

The Consolidated Electric Lamp Company employs 600, in the manufacture of incandescent lamps, and, in 1928, purchased the concrete and steel shoe plant, the largest and most modern factory of its kind in Lynn, built and occupied up to that time by A. E. Little, Inc. This purchase gave the Danvers concern space sufficient to more than double its production. Radio tubes, heating elements, as well as lamp bulbs, constitute this progressive company's products. F. W. Marsh is president and Jasper Marsh treasurer of this rapidly growing concern.

THE CALVIN PUTNAM LUMBER COMPANY

Established in 1836 by Calvin Putnam, the Calvin Putnam Lumber Company is today one of the oldest wood-working plants in Massachusetts.

One of the first wood moulders was installed in this mill and for the past seventy-nine years the company has enjoyed the reputation of manufacturing the highest quality of house finish.

Today its new mill, equipped with modern machinery, is one of the very few in Essex County turning out hard wood flooring.

Twenty-five acres of yard room stocked with nearly all kinds of lumber insure prompt service on all orders.

I. D. Pope is president, D. R. Pope treasurer and C. P. Pope secretary of the corporation, which has capital of $50,000.

THE CREESE & COOK COMPANY

Founded nearly thirty years ago with the conviction that merchandise of quality always would be in demand, the Creese & Cook Company, originators of the well-known line of Tony calf leathers, has consistently pursued the policy of producing only this type of leathers of the highest quality. The growth in volume of business, and the fact that its products are shipped to practically every civilized country in the world, have confirmed the beliefs of the founders, who are still actively engaged in the conduct of the company, which is capitalized at $500,000 and employs 200 operatives.

Henry W. Cook is president, William H. Creese vice president, Guy T. Creese secretary and W. T. Creese treasurer of the concern.

THE STANDARD CRAYON MANUFACTURING COMPANY

The Standard Crayon Manufacturing Company was established in Lynn in 1897, being an outgrowth of the old United States Crayon Company—the first concern to manufacture wax crayons in America.

Believing that a better class of employees could be secured in a small town, and desiring ample room for expansion, the Standard company moved to Danvers, in 1903, and was incorporated seven years later, with Capt. H. N. Comey as president, and A. B. Tenney as vice president. In 1922, when Captain Comey retired from active management, Mr. Tenney succeeded to the presidency and Clifton J. Comey was chosen treasurer. G. Duthrie-Strachan is vice president.

Several of the original employees carried on the rolls when the company was located in Lynn, removed to Danvers and are still active in the enterprise, which produces a complete line of wax and chalk crayon which is marketed to stationery and hardware concerns, and schools. Within recent years the rapid extension of the five, ten and dollar chain stores has given the company a new market for attractively-boxed crayon sets, and 100 hands are constantly employed at the plant.

THE IDEAL BABY SHOE COMPANY

Twenty-seven years ago Mrs. Adra L. Day founded Mrs. Day's Ideal Baby Shoe Company, and at the outset she bought all the raw materials, made the shoes and sold them. In a quarter of a century the concern has grown to be the largest baby shoe producer in the United States, now employing upwards of 300 operatives.

The commodities are produced under modern hygienic conditions, the

new factory being as "ideal" as the product. In designing styles every need is anticipated and investigated by thorough research and in coöperation with the medical profession. Actual plaster casts of the feet of infants at different ages are taken to insure correct lasts for the normal development of the foot, and these results are checked and verified by X-ray pictures.

Mrs. Day so conducts her business that each employee is happy in the thought that he or she is a member of the "Ideal" family. Mrs. Adra L. Day is president, and Arthur E. Day vice president and treasurer of the corporation.

The other industries of Danvers include the American Toy Manufacturing Company, producing toys and games, and employing twenty-five hands; the Beckwith Manufacturing Company, capitalized at $1,000,000, operating two factories, one in Danvers, and the other in Cambridge, manufacturing the famous Beckwith box toe and felt, and employing upwards of 300 operatives in the two plants; the Dalton Marsh Company, a division of the Consolidated Electric Lamp Company, and producing electrical specialties; the L. & B. Mfg. Co., of which A. J. Butler is president and W. C. Lunt treasurer, employing forty hands in the production of renewed electric lamps; the Merode Shirt Company, with capital of $150,000, employing seventy-five hands in the manufacture of men's shirts, W. H. Reynolds being president, C. N. Winship treasurer and W. B. Winship secretary of the corporation; E. L. Millett & Co., owned by E. L. Millett, engaged in the production of patent leather finishes in the Widen-Lord Tanning Company, employing 400 operatives in the manufacture of leather, the concern having capital of $750,000, and maintaining a Boston office at 137-139 South Street, and being managed by J. Anderson Lord, vice president and treasurer; Robert H. W. Lord, secretary, and J. A. Lord, Jr., assistant treasurer.

In 1927 the twenty-two manufacturing enterprises in Danvers employed 2,176 workers, to whom were paid $2,587,662, and they used stock and materials valued at $3,743,458, and turned out manufactured commodities whose value was $7,088,236.

GEORGETOWN

The Harriman Mill, on Rock Brook, probably was the first enterprise inaugurated in Georgetown, having been started in the 1690s. An iron work, a rope walk, a wire drawing unit, a snuff concern, some tanneries, soap and clothing concerns came along in the last century, but no local corporation was more widely advertised or more generally known than the enterprise marketing "Atwood's Bitters," which were produced there.

In 1808 the manufacture of shoes was begun in the town and it still continues after a lapse of almost a century and a quarter, four concerns utilizing about 400 hands in the production of men's and women's shoes and slippers—the Baker-Stewart-Jenkins Shoe Company, employing fifty hands in the production of men's shoes, and of which William L. Shelby is president, Robert F. Daley vice president and Fred W. Baker treasurer; The Roberts Shoe Company, which employs 500 operatives in its local and Haverhill plants, is the manufacturer of women's and children's shoes; C. S. Marston, Jr., employing sixty operatives in the production of men's and women's skating shoes, and the Molloy Shoe Company, owned by J. J. Molloy, manufacturing wooden sole shoes.

GROVELAND

The Groveland Mills were incorporated in 1925 and manufacture dress goods, flannels, cloakings and men's suitings. The plant is equipped with forty sets of cards, 226 broad looms, 14,250 woolen spindles, complete dyeing and finishing departments, five boilers and three water wheels and employs 275 operatives. Clara W. Veasey is president and Arthur H. Veasey is treasurer.

IPSWICH

As early as 1675 the town of Ipswich had grist, saw, fulling, woolen and lace mills. When the lace makers who came from England were thrown out of employment in 1834, due to the prohibitive tariff on thread exported from the mother country to the United States, they turned to their stocking frames, and that year James and Sanford Peatfield placed a rotary warp machine in operation, in Ipswich, and according to a United States census report the Newbury Hose Manufacturing Company, which was the only stocking factory in the country, in 1831, was meeting three years later the competition of four small hosiery concerns, located in Ipswich.

In 1928 the Ipswich Mills, which had long operated one of its Massachusetts units at Ipswich, closed the plant there, and sold some 1,200 tons of the machinery to mills in Moscow, Russia. The equipment was shipped from Boston in the first week of January, 1929, and three experienced hosiery makers went to Russia the following month to supervise the erection of the machinery, and to train native workers in American methods of hosiery manufacturing.

Not until June 11, 1828, does there appear to be any record of the incorporation of a sizable manufacturing corporation. On that date the Ipswich Manufacturing Company was chartered, with $200,000 capital, and began manufacturing cotton goods in 1830. Fifty years later (1880) Ipswich had three clothing and hosiery mills, capitalized at $254,500 in the aggregate, paying wages of $147,466 to 451 employees, utilizing $204,890 worth of stock and materials, and producing goods valued at $441,312; two boot and shoe concerns, employing ninety-eight hands, capitalized at $21,000, and manufacturing commodities valued at $77,000; a box factory, capitalized at $25,000, turning out $12,000 worth of products annually, and employing eight hands, and one brick-yard, with capital of $5,000, producing $3,000 worth of brick annually, and employing twelve men.

In May, 1922, the Hayward Hosiery Company was organized and incorporated, land being purchased on the line of the B. & M. R. R., upon which a building was erected that summer, and manufacturing began that September. The product from the outset has been full fashioned high-grade hosiery for men and women, and the growth of demand has necessitated the enlargement of the plant to more than three times its original size. Walter E. Hayward, of Ipswich, is president, and Hon. Perley E. Barbour, of Quincy, is treasurer of the concern, which is capitalized for $225,000, and employs seventy-five hands.

F. L. Burke & Son, capitalized for $1,198,000, employs from 200 to 500 hands, in the manufacture of heels, William R. Martineau being president and treasurer, Frank W. Burke vice president and Campbell Bosson clerk of the corporation.

The Dustbane Manufacturing Company, with capital of $35,000, manufactures a floor sweeping compound, H. G. Hahle being president and treasurer, and E. G. Schollar secretary of the concern.

In the town of Lynnfield, of 1,100 souls, the E. F. Gerry Company, of which Elbridge H. Gerry is president and Elbridge F. Gerry treasurer and secretary, produces cider and cider vinegar, and W. M. Killoran is engaged in the manufacture of slippers.

MARBLEHEAD

Marblehead, which now makes over a million dollars' worth of shoes yearly, was led into the business long after the Revolution by the decay of its former business of fishing.

Upwards of half a dozen small shoe manufactuirng units operate there today, and several smaller concerns are also engaged in the production of women's footwear.

Cutting dies, boats and wooden toys and novelties complete the types of local products.

James E. Graves employs twenty in the production of boats, the concern now being owned by E. S. Graves; Herbert Humphrey's Sons manufacture women's McKay shoes and stout ankle welts; John D. Paine and J. W. P. Orne, under the name of the Paine Shoe Company, produce infants' turn shoes; the F. A. Parker Company employs 100 in the manufacture of infants' turn shoes, Francis A. Parker, Jr., being president and treasurer of the concern; the Parker Shoe Company manufactures footwear; Daddy Scott, Inc., of which Walter B. Scott is president, Harold J. Scott, vice president, and William J. Bursaw, treasurer, produces toys and novelties; John G. Stevens manufactures children's shoes; the Taymor-Shribman Company employs seventy-five hands in the manufacture of women's shoes, Nathan Shribman being president and Aaron Taymor treasurer of the corporation; Wright Brothers, owned by William D. Wright, manufactures misses', children's and infants' shoes, and employs fifty operatives; the Beacon Shoe, a partnership made up of William E. Clark, Jr., and Frank H. Davis, manufactures infants' and children's shoes, and they also operate the Crocker Shoe Company, which is engaged in the same type of production; the N. B. Lindsey Company, owned by Ernest Lindsey, manufactures the famous Marblehead water crackers; the M. & P. Shoe Company, a partnership consisting of John D. Paine and Messrs. George and Daniel J. MacDonald, produces infants' and children's shoes; Marblehead Shoes, Inc., with capital of $50,000, employs seventy-five operatives in the manufacture of women's novelty shoes, John T. Adams being president, Horace W. Murray vice president, F. W. Mabery secretary, and Malcolm L. Bell treasurer, of the corporation; and the Stearns-McKay Manufacturing Company, with capital of $10,000, produces marine paint for boat hulls, Marion E. Maple being president and George T. McKay, secretary and treasurer.

Marblehead's twenty-one manufacturing concerns of 1927 were capitalized at $1,043,346, used stock and materials valued at $348,866, employed 408 workers who were paid $391,853 in wages and produced commodities valued at $937,622.

MERRIMAC

In Merrimac are three automobile body concerns, a brass foundry, and a manufacturer of brass specialties, but the J. B. Judkins Company—the builders of the famous Judkins closed bodies which are exhibited in every automobile salon in the country—capitalized at $200,000 and employing 400 hands, ranks as the leading industry of the town. John B. Judkins

is president, Frederick B. Judkins, treasurer, and C. Howard Poor, secretary of the corporation.

W. S. Jonah and E. D. George, doing business as Jonah & George, employ 35 operatives in the production of brass, nickel and aluminum auto body specialties; the Merrimac Body Company manufactures automobile bodies; William S. Tuckwell operates a brass foundry, and the Walker Body Company, with capital of $500,000, employs 700 hands in its Amesbury and Merrimac plants, in the manufacture of automobile bodies.

In the seven manufacturing establishments of Merrimac the total amount of capital employed in 1927, was $74,884; the value of the stock and materials used was $636,141; the 550 employees were paid $614,949 in wages, and they turned out manufactured commodities valued at $1,805,348.

METHUEN—A BUSY INDUSTRIAL TOWN

Originally Methuen was engaged in the manufacture of hats, the industry being started there at an early date, followed by the production of shoes. K. C. Gleason was among the first in New England to embark in



K. C. GLEASON
of Methuen
Pioneer manufacturer of hats

soft or felt hat manufacture, beginning business in Methuen, in 1838, and continuing his operations for twenty-one years thereafter when he removed to Laconia, N. H.

Joel Robinson, of Methuen, was given a patent in 1848 on a shoe-pegging machine, which contained several novel features, and which performed automatically the several processes of punching the holes, and inserting and driving the peg.

Not until 1864 did the town make its advent into the textile field which now constitutes the chief claim of the place to industrial fame. In that year the Methuen Woolen Company was formed and about the only other sizable local concern of the decade was a chemical corporation.

The International Worsted Mills, established in 1914, and incorporated five years later, with capital of $700,000, employ 300 hands in the manufacture of textiles, Frank G. Murch being president and treasurer, and M. B. Finnegan, secretary; the Joseph Bentley Hair Company, of which John W. Bentley is president and treasurer, is engaged in the production of recombed wool; the Lawrence Burling & Sewing Company, owned by Alfred C. Gaunt, employs 75 operatives in burling and mending; the A. Lee Company, of which Ashton Lee is president and treasurer, and M.

Lee, vice president, manufactures chemicals and dyestuffs; the Merrimac Mills employ 150 operatives in the manufacture of cotton and worsted yarns, hosiery and worsted piece goods, Alfred C. Gaunt being president and treasurer and E. M. Hacker, secretary of the corporation, which is capitalized for $250,000, and which in 1929 bought the Methuen Yarn Mill, owned by J. W. Jowett, and are operating the plant; and the Methuen Company, with capital of $300,000, employs 300 hands in the manufacture of cotton flannels, Nathaniel Stevens being president, and William T. Dowling, treasurer of the concern; and the Lawrence Knitting Company, incorporated in 1898, with capital of $30,000, producing men's, women's and children's worsted and lisle seamless hosiery and employing fifty operatives; Ernest Munroe is president, and George A. Hunting, treasurer.

The Selden Worsted Mills were founded by George L. Selden, in 1903, and six years later Frank G. Murch was admitted as a partner. In 1917 the mills were incorporated and are now operated by James K. Selden. The concern specializes in men's and women's dress goods, its principal product being light men's wear, marketed under the trademark of "India Tropicals." In 1929 the corporation leased the idle Sagar Worsted Mills, formerly the Bolton plant, and are operating them today.

Capitalized for $350,000, the company employs 150 operatives, M. K. Selden is president, James K. Selden, treasurer, and W. E. Rowell, secretary, of the corporation.

The Methuen Shoe Company, established in 1928 is now producing 2,000 pairs of women's McKay shoes a day and employ 250 operatives. A. J. Mahoney is president and T. W. Dow, treasurer.

Methuen's nineteen manufacturing establishments had aggregate capital in 1927, of $13,566,680, used stock and materials valued at $5,676,807, employed 1,263 workers to whom were paid $1,207,027 in wages, and fabricated products valued at $8,174,233.

NEWBURY

In 1699, the town of Newbury, on certain conditions, granted Ebenezer Knowlton nine rods of land "for the setting up of a tanning trade."

As early as 1759 the first horn-comb factory in the United States was established in Newbury and in 1793 large quantities of horn combs were made in West Newbury.

Paul Pillsbury, the Newbury inventor of shoe pegs and a machine for their manufacture, carried on the process for a number of years behind closed doors, due to the fact that he did not protect his inventions by patents.

The first incorporated woolen company in Massachusetts, erected a factory at the Parker River Falls, in the Byfield Parish, of old Newbury, as early as 1794, the machinery being made by Messrs. Strandring, Armstrong and Guppy. The original principal, and afterward sole owner, was William Bartlett, and associated with him were William Johnson, Nicholas Johnson, Michael Hodge, Joseph Stanwood, Mark Fitz, a Mr. Currier of Amesbury, Mr. Parsons; who became Chief Justice, Jonathan Greenleaf, James Prince, Abraham Wheelwright, Philip Coombs, and possibly others. The mill was operated by Arthur, John and James Scholfield, John Lee, Abraham and John Taylor, John Shaw, James Hall and a Mr. Aspinwall, who came from Oldham and Saddleworth, England.

It is known that John Lee of the group succeeded, in 1804, in shipping clandestinely, from England, in large casks labeled "hardware," in charge

of his brother-in-law, James Mallalow, a quantity of cotton machinery, consisting of drawing and spinning frames, or mule throstles, and, in order to avoid suspicion, Mallalow followed in another vessel. The machinery was at first employed in spinning wick yarn and warp, but bed ticking, coarse gingham, sheeting and other heavy fabrics, all woven by hand, were soon after added, the gingham and sheeting each selling for 70 cents a yard.

In 1809 a power loom projected by Dr. Josiah Richards, while a student of medicine at Claremont, N. H., was placed in operation by water power at the Byfield factory, but it failed, through some defect in the machinery.

In the old town of Newbury, snuff and polishing felt are today produced, the Byfield Snuff Company, capitalized at $96,000, employing twenty hands, in the manufacture of the former commodity, Benjamin Pearson being president, Abbie M. P. Hale treasurer and Grace B. Litch secretary of the concern.

The Byfield Woolen & Felt Co., with a capital of $100,000, employs 100 hands in the production of polishing felt, Alfred S. Williams being treasurer and secretary and M. K. Williams president. The plant is equipped with eight sets of cards.

NORTH ANDOVER'S INDUSTRIAL ENTERPRISES

In the summer of 1802, James Scholfield, brother of Arthur and John Scholfield, who were so prominent in the woolen industry, in Charlestown, Byfield, Pittsfield and in Connecticut, removed to North Andover, and purchased land, with a mill privilege, on which was a dam and a fulling mill, near the mouth of the Cochichewick River. Here he erected a small building for his carding machine, which was the only device he had that was adapted to being driven by water, and produced broadcloth. The enterprise does not appear to have been very successful, and in 1812 he sold his half interest to Paschal Abbot, while his brother, Arthur, who had held the other half, disposed of his share to Abel Abbot. In 1813, the Messrs. Abbot transferred two-thirds of the property to Isaac Osgood and Abraham Marland, and five years later Samuel Ayer became the sole owner of the property, the Messrs. Abbot removing to what was then called Andover South Parish, the locality afterwards known as Abbot Village, where they built a woolen mill, in which they produced satinets and flannels until the financial crisis of 1837, when they were forced to give up business. The mill built by them was sold to Smith, Dove & Co., in 1843.

Samuel Ayer operated the Scholfield Mill until 1826, when he disposed of it to William Sutton and Ward Pool, but apparently the latter did not long remain as an owner. William Sutton immediately modernized the plant, installing power-looms, and made the concern one of the most successful of its kind. Upon his death in 1832 the management passed to his sons, William and Eben, the former remaining active in the concern until 1836, when he sold his interest to his brother, Eben, who managed the plant until his death, in 1864. In 1839 the so-called North Andover Mill was erected. Eben Sutton was succeeded by his nephew, Eben Sutton, second son of William, who made many enlargements of the plant, and successfully conducted it to the time of his death, in 1890.

It is a fact of more than passing historic interest that on the site of the present mills was established, with all the processes—carding, spinning, weaving, fulling and finishing—the oldest continuous woolen industry in this country, its water power having been occupied for a period of

128 years and the property being owned or operated, with great success, for upwards of 104 years of that time, by the same family, descending from great-grandfather, grandfather, grand-uncle, and father, to the present owners.

In 1905 Sutton's Mills were incorporated with $200,000 capital. Today they are equipped with fourteen sets of cards, eighty-two broad looms, 4,800 spindles, two pickers, three boilers, and three water wheels, as well as dyeing and finishing departments, and employ 400 operatives.

Richard S. Russell is president, George H. Clough treasurer and Harry Sutton agent. The products are woolen dress goods and coatings.

THE DAVIS & FURBER MACHINE COMPANY

In 1836 a machine shop was erected on the site of Isaac Osgood's grist mill on the Cochichewick River, in North Andover, and in 1848 it passed into the hands of George L. Davis and Charles Furber, and there was formed the famous Davis & Furber Machine Co., now capitalized at $2,022,500, which today affords employment to 750 hands. From its beginning the company was remarkably successful and its position in the field of production of textile machinery has been prominent for almost a century.

The history of this enterprise constitutes another striking illustration of the growth of an immense manufacturing industry from the smallest beginnings. The concern had its origin in 1832, in South Parish, Andover, its founders being Jonathan Sawyer and Russell Phelps, who rented a small room in the lower part of the Abraham Marland Mills and who formed the firm of Sawyer, Phelps & Company. In 1834 the founders sold out their interests to Charles Barnes, George H. Gilbert and Parker Richardson, who operated as Barnes, Gilbert & Company. In 1836 the new owners transferred the business to North Andover, to what is called Machine Shop Village. In 1841 Benjamin W. Gleason and George L. Davis entered the firm, which became Gilbert, Gleason & Davis, and from that year to the present the name of Davis has been continued in the business.

George L. Davis remained financially and actively interested in the concern for a half century. In 1835, when a youth of nineteen years, he left his father's farm in Oxford, and made his way to Andover where he learned the machinists' trade with the firm of Gilbert & Richardson, when it was occupying what was called "The Paper Mill," in that town.

Until 1836 the nearest railroad shipping point for the firm's products was Wilmington, but that year the Boston & Portland R. R. Co., now a division of the Boston & Maine system, built trackage from Wilmington to Andover, and by 1843 further railroad connection made it possible for the machinery produced by the company to be shipped north direct to Portland, Maine, or south to Boston, and connecting points.

Mr. Gilbert, who had moved to Ware, disposed of his interests in the firm to his partners in 1846, and for two years thereafter the business was carried on by the firm of Gilbert & Davis, when they were joined by Charles Furber, and the concern operated under the style of Gleason, Davis & Furber. Mr. Gleason disposed of his interests to his partners in 1851 and the firm name was then changed to Davis & Furber. The succeeding years chronicled a rapid development of the concern. On June 19, 1857, Mr. Furber died at the comparatively early age of thirty-nine years, and that year a story was added to the plant, while new equipment was installed from time to time.

Mr. Davis purchased the Furber interests and continued operations

alone for about six months, when Joseph M. Stone, Daniel T. Gage and John A. Wiley entered the partnership. Mr. Gage remained with the firm but a year or two, but Messrs. Stone and Wiley spent the rest of their lives building up the reputation of the Davis & Furber Company.

Joseph M. Stone was an inventor of rare ability and under his leadership the company's machinery was vastly improved. John A. Wiley devoted his energies to the selling end of the business.

On January 1, 1868, three sons of two of the partners—George Gilbert Davis and James H. Davis, and Joseph H. Stone, joined the partnership. The latter was actively identified in improving the company's accounting system, and with his father, in developing the machinery. James H. Davis was especially interested in the manufacture of card clothing and he brought that department to a high state of efficiency.

On Jan. 1, 1883, the Davis & Furber Machine Company was incorporated under the laws of Massachusetts with capital of $400,000 and with George L. Davis as its treasurer. Under the able management of George Gilbert Davis, who for many years was the head of the concern and who became treasurer following the death of his father in 1891, the company expanded to twice its original size. George Gilbert Davis died in 1920. Eben A. Baldwin and George L. Hamilton, both of whom served as directors for many years, were active in the management until their respective deaths, and were of great assistance to George Gilbert Davis in promoting the company's welfare.

The Davis & Furber Machine Company now occupies the same site and utilizes the same power on the Cochichewick brook in North Andover which was first occupied by the old firm of Gilbert & Richardson in 1836, but instead of one small, two-story, pitched roof building containing a few tools, there are now ten commodious shops and foundries, with a floor space of nearly fifteen acres filled with the most modern and approved machinery of the twentieth century, besides freight houses and comfortable cottages for the families of the small army of workmen who are required to meet the demands of the plant. In all, these factory buildings and cottages cover a total area of seventy acres and are recognized as models of their kind. Instead of only cards and spinning jacks being produced, as was the case in the early days, this giant corporation now builds nearly every kind of machine required in the manufacture of wool, including all types of card clothing. Not only does it make woolen and worsted cards and mules, but it also builds nearly every kind of machine used in the production of woolen and worsted yarns, including nappers, card clothing, etc. The company is now and has been for many years recognized as the largest builder of this type of machinery in the whole United States.

It was the pioneer in this department of manufacturing industry and has always held and continues to hold first place of its kind in America.

The company has sent its products into every state in the Union where there exists a woolen mill, as well as Canada, Mexico, the West Indies, South America, Japan and into some parts of Europe. Back of the enterprise there have always been strong, determined and progressive men until the concern stands today as representing the highest type of progressive industries of its type. It is employing the best of engineering talent and technical skill to improve its machinery. As a conservatively managed concern it has weathered the storms which have wrecked both larger and smaller competitors. Its products are sold with a guarantee implied and expressed and tested by generations of textile manufacturers. The company is managed by a board of directors consisting of George L. Wright,

president; Samuel F. Rockwell, treasurer; Oscar M. Godfrey, clerk, and Andrew Gibson, assisted by an energetic and capable force of designers, mechanics and salesmen.

The company's works are operated by steam of 1,000 horsepower and give employment to over 1,000 men in busy seasons.

Situated in North Andover is a unit of M. T. Stevens & Sons Co., of Andover, producing woolen and worsted goods. It was here in 1814 that Nathaniel Stevens began the manufacture of flannels, and became the pioneer producer of this type of fabric in America.

The Manufacturers Machine Company, capitalized at $150,000, is engaged in the production of cooling and conditioning machines, Ivar L. Sjostrom being president and treasurer, and A. M. Nolan secretary; and the Brightwood Manufacturing Company, incorporated in 1895, with capital of $500,000, employing 550 operatives in the manufacture of men's wear and women's dress goods, Granville E. Foss being president, and George H. Simons treasurer. The company also has complete dyeing and bleaching departments.

The ten manufacturing establishments in existence in North Andover in 1927 were capitalized at $8,777,513. They required stock and materials that year valued at $4,265,131, gave employment to 1,470 workers to whom were paid $1,815,238 in wages, and turned out manufactured products valued at $7,322,416.

ROCKPORT'S INDUSTRIES

Rockport, now the seat of a number of sizable manufacturing concerns, was the location in 1847 of the Annisquam Mill, which began the manufacture of cotton duck, but when this plant was destroyed by fire on December 9, 1883, the type of local production underwent a change. At one time the Cape Ann Oil Cloth Company manufactured all kinds of oil clothing.

THE GRANITE INDUSTRY OF CAPE ANN

For many decades the granite of Cape Ann has been highly regarded in construction circles, being prized for its firm texture, its high crushing test and its freedom from pyrites and other impurities and today it is largely used for buildings and monumental purposes, and for paving blocks.

Save for what was required for the use of early settlers on Cape Ann, no granite was quarried from the well-nigh inexhaustible supply until 1800, in which year a millstone was turned out to fill an order from Newburyport.

Twenty-three years later, the local granite industry made its real start, and from that year to 1842 Rockport granite was harvested and used in the United States Government fortifications on the islands of Boston Harbor and at the Charlestown and Portsmouth Navy Yards.

Nehemiah Knowleton cut about 500 tons of stone from cobbles in the rear of the old Lurvey house, at Pigeon Cove, or in that vicinity, and advertised the product for sale in a Boston newspaper, with the result that Major Bates, of Quincy, observing the announcement, came to Sandy Bay, Rockport, and soon after began the quarrying of granite, with William Torrey, of Quincy, the work continuing for about two years, when it was temporarily abandoned, to be resumed in 1828 on part of the property now owned by the Rockport Granite Company, and then known as the Torrey Pit. In 1829 Torrey commenced operations at Folly Cove,

where cap and flag stones were quarried, and where his two sons, Solomon T. and William J., joined him. In 1830 he abandoned the Folly Cove quarry and returned to the Sandy Bay location. Later Messrs. Colburn and Eames, Benjamin Hale and others, began quarrying operations in Rockport. At the height of the business, Mr. Torrey owned an interest in at least six sloops, which he kept constantly employed in freighting granite.

Beniah Colburn moved to Rockport two years after Mr. Torrey settled there, and became one of the foremost quarrymen of Cape Ann. He was followed by Ezra Eames and Amos C. Sanborn, Zachariah Green and Jeremiah Wetherbee. Messrs. Green and Wetherbee formed the Gloucester and Boston Granite Company, and later were joined by John Stimson, a son-in-law of Mr. Green. They opened a quarry on what is now the property of the Rockport Granite Company, and began the erection of the wharf and breakwater, owned by that corporation. They also built the stone house and barn, now standing upon the premises of the Rockport concern.

In 1827, Messrs. Colburn & Eames formed a partnership and opened a quarry at a point where a hill of stone, which rose some twenty feet above the level of the road, was situated, and where they quarried stone of good quality that found a ready market in Portsmouth, Boston, Salem, and elsewhere, for monumental purposes.

The stone for the chain bridge over the Merrimack River, just above Newburyport, was taken from this quarry, in 1828. When they had worked the supply down to tide-water level they abandoned the quarry, as steam engines for pumping had not been thought of, and it became impossible to syphon the water, which seeped in from springs and recurring rains.

A few years later, John Stimson began quarrying in his own name at the Flat Ledge, which was afterwards owned by William H. Knowlton, and there he cut the first paving blocks ever produced on Cape Ann, the products being shipped to Fort Warren, Boston Harbor, in the sloop *Fox B.*, of between twenty and thirty tons burden.

The firm of Eames, Stimson & Co., made up of Ezra Eames, John Stimson and Beniah Colburn, was then formed, and operations began near where Stimson had previously carried on his quarrying. Colburn soon withdrew from the concern, and operated a quarry at Hodgkins Cove, now known as Bay View, which had originally been opened by Richard W. Riker and Kilby Sargent. It was here that Colburn made the products known as New York blocks, which were first laid on the edge, instead of on the flat, on Exchange Street, Boston. In 1852-3 he shipped granite underpining to San Francisco to be used in government buildings, and in 1857 he sent paving blocks to New Orleans.

Eames, Stimson & Co. operated on a part of the property now owned by the Rockport Granite Company, and the various partners of this successful concern included Anson, Aaron and J. Henry Stimson, George R. Bradford, Joshua Sanborn, Abraham Day and Jotham Taylor.

From the crude methods first employed in quarrying and handling granite by hand power and transporting it to the shipping point by oxen, the industry passed successively to the use of the hand derrick in 1836, to the steam hoisting engine in 1853, to the steam pump the next year, to the steam drill in 1883 and to the quarry railroad in 1885, while compressed air machines for use in air drills and hoisting were first installed in 1905.



ONE OF THE QUARRIES OF THE ROCKPORT GRANITE COMPANY

THE ROCKPORT GRANITE COMPANY

In 1864 all of the assets of Eames, Stimson & Co. were acquired by a group headed by John Henry Stimson and the Rockport Granite Company was incorporated that year, Mr. Stimson at one period owning nearly half of the entire capital stock. His corporation associates were John L. Thaxter, Salem T. Lamb, William F. Dow, Benjamin P. Battles, R. T. B. Fiske and John Lathrop. Hon. Lemuel Shaw was the first president.

The corporation purchased from time to time the quarries of William Hale Knowleton, William Torrey and Messrs. Preston and Fernald, and the cut leading from the company's quarries to its wharves was begun in 1868, while the arched stone bridge was erected four years later.

Soon after incorporation, John H. Stimson became its treasurer and general manager, which position he held until 1881. On January 23, 1882, Charles S. Rogers, who had been associated with the company since its incorporation, as a director and as assistant treasurer, was chosen treasurer and general manager, which positions he held until his retirement on March 9, 1914. He was a native of Danby, Vt., where he was born February 19, 1840, and an operator of prominence among the granite producers, contractors and architects for many years and was held in high esteem by them because of his untiring efforts in behalf of the interests of the industry, as well as for his reputation for just and upright dealings. His two sons, C. Harry Rogers and Louis A. Rogers, became connected with the company in 1892, the former being elected assistant treasurer on April 13, 1895, and treasurer on March 9, 1914. Louis A. Rogers was for several years purchasing agent, and on March 11, 1914, was chosen assistant treasurer. Both hold these positions today. Many of the assistants and superintendents have been with the company since boyhood, and have grown up with the business.

THE GROWTH OF THE CORPORATION

In 1893 the property of the Cape Ann Granite Company, a large acreage located in Bay View, Gloucester, comprising land, tenements, tools and vessel property, was purchased, and in October, 1894, the Edwin Cannery quarry and all tools and equipment, located at Pigeon Cove, in Rockport, were acquired.

The James J. Vernon property was purchased in January, 1896, with all equipment, these quarries being adjacent to the Cape Ann Granite Company plant, and in January, 1909, the property formerly owned by the Lanesville Granite Company, at Lanesville, including tenements and equipment, was bought.

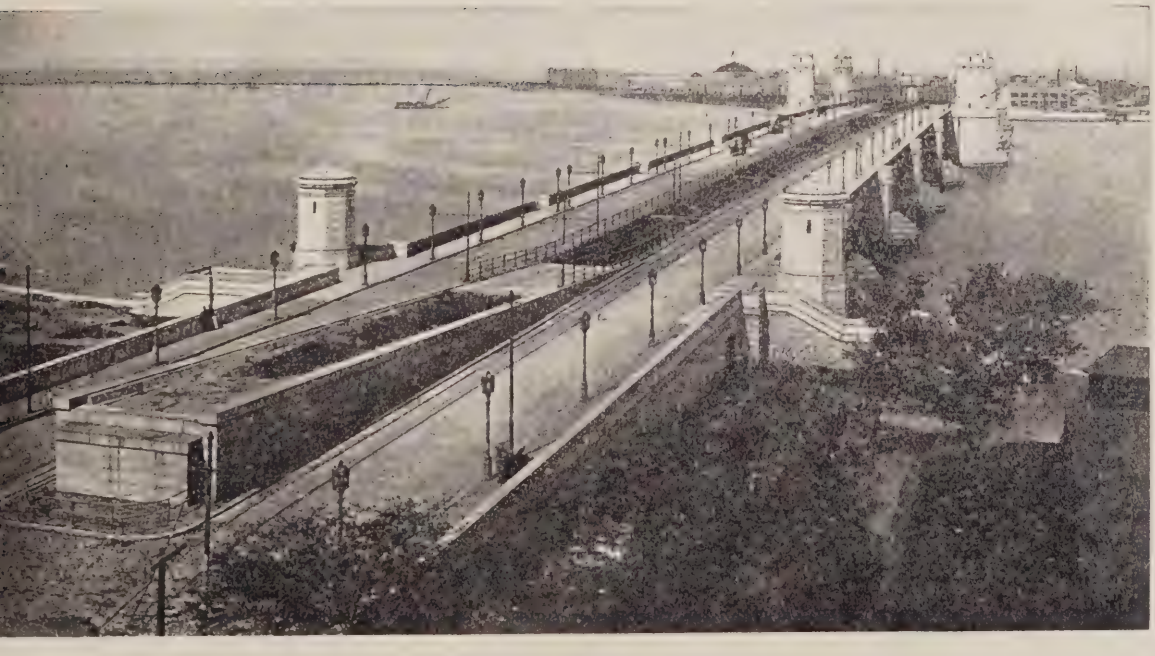
Between 1895 and 1915 the company purchased various parcels of land at Halibut Point, Pigeon Cove, comprising 100 acres of valuable shore property, a small portion of which has been operated as a quarry, and in 1914 it purchased the quarry property, equipment and the vessels of the Pigeon Hill Granite Company, the realty being adjacent to the original property of the Rockport Granite Company, in Rockport.

In addition to its properties on Cape Ann, the company owns an island at Jonesport, Maine, comprising about seventeen acres where is located a beautiful red granite, known as Rockport Moose-a-bec Red. The deposits of granite at Cape Ann are practically inexhaustible, and of two different shades—Rockport gray, and Rockport sea-green, in color.

The company has its main office at the home plant in Rockport, with branch offices in Boston, New York and Chicago. The properties consist



CUSTOM HOUSE TOWER,
BOSTON



LONGFELLOW BRIDGE, BOSTON

of more than 600 acres of quarry land, with finishing, cutting and polishing sheds, wharves, and a fleet of sloops, schooners, barges, towboat, and lighters. It charters the best class of coasting schooners, barges and steamers up to 2,500 and 3,000 tons capacity for shipment along the Atlantic seaboard and to the Gulf of Mexico.

IT OWNS ITS RAILROAD SYSTEM

Air compressors with an aggregate capacity of 7,000 cubic feet of air a minute, polishing wheels, lathes, surface cutters, etc., are included in the equipment and the company owns its railroad system which connects its quarries with the wharves, about nine miles of standard gauge railroad, numerous cars, locomotive cranes, and three standard gauge locomotives.

The Rockport Granite Company has specialized in granite paving blocks of the best type and has furnished them to nearly all the cities on the Atlantic seaboard, as well as cut granite and monuments to many of the principal cities throughout the United States.

The Rockport product, known as the "Granite of Character," is a true Hornblende, resembling in composition the Egyptian granite from which ancient obelisks and sarcophagi were built. It is of decided toughness, firm and uniform in texture, of high crushing test, free from impurities, enduring in color, and susceptible to a beautiful and lasting polish.

Particularly significant of the toughness and carving quality of it is the fact that Prof. John H. Sears, of the Peabody Academy of Science, was able, in his microscopic studies of this stone, to make sections of it 1/700 of an inch thick.

WHERE THE PRODUCT GOES

Rockport granite has been used in such representative structures as the Registry of Deeds and Probate Building, in Salem; the Suffolk County Courthouse, in Boston; the Baltimore, Md., Post Office; the National City Bank and the Seigel-Cooper Building, in New York; the American Baptist Publication Society Building and the Real Estate Trust Company Building, in Philadelphia; in the green polished columns of the Madison Avenue Presbyterian Church, in New York City; in the B. F. Goodrich Company Building, in New York; in eighteen monoliths for the Peoples Gas & Coke Company Building, in Chicago, weighing about fifty tons each, which are highly polished; in the two immense bowls on the Plaza in front of the Union Station, in Washington, D. C.; in the Lytton Building, in Chicago; the polished base of the Woolworth Building, in New York; in the polished fronts of the Syndicate Building, in Minneapolis; in the polished monoliths of the Woodward Building, in Washington, D. C.; in the polished monoliths and base of the National State Bank, in Newark, N. J.; in the base of the Sharples Building, in Chicago; in the polished base and entrance pilasters of the Hamilton Club, in Chicago; in the Mellon National Bank, in Pittsburgh; and in the Custom House Tower, in Boston. The Longfellow Bridge, which connects Boston with Cambridge; the great spandrel walls of the Brooklyn Bridge; the Williamsburg Bridge, in New York; the Manhattan and Queens approaches of the Blackwell's Island Bridge, in New York; the Manhattan anchorage of Bridge No. 3, in New York City; the University Heights Bridge, in New York, and the new Washington Street Memorial Bridge, in Providence, R. I., are all constructed of Rockport granite. The Logan monument, in Chicago; the

Miles Standish monument, in Duxbury; the base of the General Scott equestrian monument, in Washington, D. C., one stone of which weighed 149 tons in the rough; and the Providence War Memorial, in Providence, R. I., are all constructed of the famous products of the Rockport Granite Company. Jetties at Key West, Fla., Sabine Pass, Texas, Newburyport, Mayport, Fla., and Galveston, Texas; breakwaters at Plymouth and Revere; the Dog Bar breakwater, at Gloucester; and the breakwater at Sandy Bar Harbor of Refuge, on Cape Ann, are built of Rockport granite, as are also the United States Government dry docks at Brooklyn, N. Y., and Norfolk, Va., as well as the piers and quays for navy yards and the better grade of wharves and docks in most of the large seaports on the Atlantic Coast.

The present officers of the corporation are: Charles E. Fisher, president; C. Harry Rogers, treasurer; Frederick H. Tarr, clerk; who, with Col. Charles R. Gow, Ezra L. Phillips, Louis A. Rogers and Richard B. Fisher, constitute the board of directors. The corporation has capital of $300,000 and employs 700 operatives.

OTHER GRANITE OPERATORS OF CAPE ANN

Some years after the incorporation of the Rockport Granite Company, Thomas Peach began quarrying granite, at Halibut Point, and shipped it from Hoophole Cove, while Benjamin Hale and Joseph Babson opened a quarry on the Babson Farm, shipping the stone from a nearby cove, where they built a wharf. Benjamin Hale also operated the Pigeon Hill quarry, and Samuel and William Parker, Alpheus C. Pierce, George W. Johnson, Charles Dorman and Elijah Edmands were among later operators.

The Bay State Granite Company carried on extensive operations at one period, while Luke Sewall early opened up a quarry on his land, and later formed a partnership with John Preston and James Fernald, under the name of Preston, Fernald & Co., shipping their stone from Knowlton's wharf.

William Hale Knowlton opened the Flat Ledge and carried on business for several years.

In 1870, the Pigeon Hill Granite Company was formed by George R. Bradford, Anson Stimson, Amos Rowe and Levi Sewall, and later Frank Scripture became a partner in this concern, which was next in capacity to the Rockport Granite Company, and which built the first local quarry railroad.

Amos Rowe cut the largest boulder on Cape Ann, located near the top of Pigeon Hill, which was estimated to weigh more than 2,000 tons. From it he cut thousands of feet of edgestone and a great quantity of marketable stock, of excellent quality, which split as readily as the granite from the quarries.

OTHER INDUSTRIES OF ROCKPORT

The Cape Ann Tool Company, capitalized at $80,000, employs 100 hands in producing drop forgings, some of which went into Colonel Lindbergh's "Spirit of St. Louis." Lindley I. Dean is president and William J. Dean is treasurer.

The manufacture of isinglass from the fins of hake fish, begun in Rockport, in 1824, is still an important industry. Glue, gelatin, and cloth abrasives are also manufactured there.

The town's five manufacturing plants in 1927 had aggregate capital

of $725,663; they used stock and materials valued at $253,624, employed 236 workers, to whom they paid $324,374 in wages, and turned out commodities valued at $891,928.

At one time Rowley had shoe manufacturing units whose annual products were valued at $200,000, and heel and rand concerns turning out commodities valued at $100,000.

Today, William C. Foster's Sons, a partnership made up of Messrs. William S. and H. C. Foster, employ seventy-five in the manufacture of shoes, and the Rowley Baby Shoe Company, of which W. H. Keyes is president, and K. B. Keyes treasurer and secretary, produce infants' shoes.

Tradition has it that at a mill located on the Powow River, in Salisbury, the first contract for cloth for the American Army was filled in 1812.

SAUGUS

English workmen settled in Saugus as early as 1643 and set up their foundry on the west bank of the Saugus River, at the head of tide-water, where they turned out, in a primitive way, iron manufactured from the bog ore taken from the bed of the stream, but the Hammersmith Village they established disappeared many, many decades ago, and was followed by Makepeace's snuff and chocolate factories, which flourished at the tide-mill at East Saugus from 1792 to 1844; by Pranker's Woolen Mill, subsequently the Pranker Manufacturing Company; by Scott's Mills, where morocco and kid were produced; by the North Saugus Linen Duck Company, which began operations in 1814; by the Lynn Wire & Screw Manufacturing Company; by a concern which used the deposits of fine blue clay to turn out crockery ware, beginning about 1808, and by various shoe and brick-making concerns of later years, all of which have vanished in the intervening time.

L. V. Boardman carries on the manufacture of shoes in the Cliftondale section of the town; the Cellugraph Engineering Corporation, owned by A. E. Leon, manufactures Cellugraph oilless bearings; the Eastern Tool & Stamping Company produces metal stampings, at its East Saugus plant, the concern being capitalized for $50,000, Helmer G. Josephson being president, Harry I. Thompson treasurer, and Adolph Daklin secretary, of the corporation; the Excel Shoe Form Company, of which W. L. C. Niles is president and treasurer, employs twenty-five in producing shoe forms; and the Colonial Braiding & Weaving Company, of which A. J. Forde is president and treasurer, manufactures silk shoe laces, the plant being equipped with 500 braiders. Fifty hands are employed.

In 1918, Abram, Albert and Paul Salter bought the plants of the F. D. Weeks Extracting Company, and the Gould Manufacturing Company, in Shirley, and operated them successfully for ten years, purchasing late in 1928 the idle plant of the United States Worsted Corporation, in Saugus, which was renovated and refitted as a wool shoddy manufacturing unit. At that time the name of the concern was changed from Shirley Mills to Salter Mills. The new plant is completely equipped with carbonizing machines, washers, extractors, dusters, rag pickers, dye tubs, and dampers, and employs thirty hands.

Abram Salter is president, Albert Salter treasurer, and Paul Salter secretary.

In 1927, the local establishments used stock and materials valued at $306,675, employed eighty-eight workers, who were paid $167,277 in wages, and produced commodities valued at $647,781.

SWAMPSCOTT

Among those who excelled in stock husbandry were the first settlers of Lynn, principally farmers, and who owned large herds of horned cattle, sheep and goats. For many years before their lands were divided or fenced, their neat cattle were kept in a common herd under an overseer or hayward, and the Island of Nahant was the common sheepwalk, where the flocks were attended by a public shepherd. Whether the bovine and ovine wealth of the farmers of Lynn promised a better supply of material does not appear, but in the Village of Swampscott, originally a part of Lynn, was erected the first tannery in New England. The first white settlers of Lynn were Edmund and Francis Ingalls, from Lincolnshire, England. The former, in 1629, settled as a farmer in the eastern part of the town, where the site of his residence is still pointed out on Fayette Street. His brother, Francis, built a tannery on Humphrey's Brook, where it was crossed by a stone bridge, but the precise date is not stated. The vats were filled up in 1825.

Today, Swampscott is almost exclusively residential, crushed stone, shoe patterns and patternmakers' supplies constituting its principal industrial products.

The Lynn Sand & Stone Company, with capital of $300,000, employs forty men in quarrying crushed stone, J. H. Cook being president and treasurer of the concern; and J. H. Sutherland & Co., a partnership made up of John H., Holton J. and Alfred J. Sutherland, carries on the manufacturing of shoe pattern machinery and tools.

TOPSFIELD

As early as 1648 mining was carried on at Topsfield, as in that year a copper mine was discovered on land owned by Governor Endicott. Mr. Leader, a metallurgist, then superintendent of the Lynn Iron Works, having expressed a favorable opinion of the ore, Governor Endicott spent considerable money in working the mine, which was located on the turnpike. About 120 years afterwards it was reopened and worked for a short period, with loss to its proprietors. About 1846 a company of Salem capitalists caused the old shaft to be cleared, and the ore subjected to analysis, which, however, was so unsatisfactory that the excavation was filled up.

Iron ore was dug in the lowlands, to a considerable extent, by the earlier settlers of Topsfield. July 17, 1681, Ensign Gould was granted liberty to dig twenty tons of bog iron. Lieut. Francis Peabody later received the same permission. Bricks were manufactured in Topsfield before 1697.

The first local mill was erected in Topsfield by Lieut. Francis Peabody in 1672, on the site of what was then described as the "Towne's grist mill." The next was probably a grist mill erected by Thomas Howlett, on Howlett's Brook, in the east part of the town, in 1736. Two or three years later he built a sawmill there. In 1746 he sold it to Nathaniel Hood, who, in 1748, transferred the mill to Abraham Hobbs. The plant remained in the Hobbs family until 1813, when it passed into the hands of the Perkins family. In 1878 the grist mill was purchased by Wellington Donaldson.

A hundred years ago Topsfield was one of the Essex County towns engaged in the manufacture of shoes. So important was the local in-

dustry at that time it attracted the attention of the editor of the *Dunkirk Beacon,* who, in the issue of that paper of February 7, 1837, wrote:

"As an evidence of New England industry it is stated that the town of Topsfield, Mass., alone sent during the last year two hundred thousand pairs of shoes of various kinds to the South and West, and that two young men who commenced business a few years ago with a capital of but a few hundreds of dollars, manufactured last year ninety thousand pairs, and their sales amounted to $80,000."

Today, Topsfield's only industry is one engaged in sand and gravel products—the Connolly Company, of which Gregory P. Connolly is president, S. John Connolly treasurer, and Eugene T. Connolly secretary.

ESSEX COUNTY AS A MANUFACTURING CENTER

Here is presented a statistical picture of Essex County's prominence in the industrial life of Massachusetts. It shows a production in 1927 of nearly half a billion dollars, commodities valued at $469,303,505 being manufactured in the 1,608 plants located in the county.

Upwards of 89,000 men and women were that year employed in these establishments, to whom were paid $110,783,041 in wages. The 1,608 concerns used stock and materials valued at $244,747,782, and the concerns employed invested capital amounting to $388,838,916.

CHAPTER XXV

THE NOTABLE INDUSTRIAL ACCOMPLISHMENTS OF THE TOWNS OF FRANKLIN COUNTY

Franklin County, possessing a total population of 50,000 in its twenty-six towns, and the only major geographical division in the commonwealth, outside the island counties of Dukes and Nantucket, and the Cape Cod County of Barnstable, that can boast of no city within its confines, harbors 122 manufacturing enterprises, some of them the largest of their kind in the world.

Situated in the far western part of the state, with eight of its towns tapping the Vermont line, these Franklin County concerns produced, in 1927, manufactured commodities valued at $28,486,173.

Fifty-seven of them, or nearly one-half the total, are located in the towns of Greenfield and Montague, the thirty-seven in Greenfield producing articles that year valued at $7,660,069, while the twenty in Montague manufactured commodities valued at $7,352,067—the enterprises of these two municipalities accounting for more than 50 per cent of the total value of products made in Franklin County in 1927.

Next in value came the products fabricated by twenty manufacturing units located in Orange, where commodities valued at $6,260,824 were made that year, followed by the articles produced by eight concerns in Deerfield, valued at $1,272,216.

The thirty-seven manufacturing enterprises located in fourteen other Franklin County towns manufactured goods valued at $6,260,834 in 1927.

Wages amounting to $6,763,681 were paid that year to 5,606 industrial employees in the 122 manufacturing establishments of the county, and stock and materials valued at $11,527,719 were used by these concerns in 1927.

The industries of Greenfield were the largest employers of labor, carrying an average of 1,613 workers, in 1927; Montague came second, with 1,471 industrial wage earners; Orange third, with 1,040 employees; while 160 were enrolled on the payrolls of the Deerfield concerns, and 1,322 were employed in the other fourteen towns of the county in which manufacturing was carried on, that year.

INDUSTRIES OF ASHFIELD AND BUCKLAND

The Stanley Rule & Level Company operates a branch plant in Ashfield, which is managed by H. E. Hannon. Wood novelties are produced, such as tool handles and the like.

The Mayhew Lumber Company, a subsidiary of the Mayhew Steel Products Company, Inc., of Shelburne Falls, operates a local plant in the town, where the lumber later converted into tool handles is secured.

Silas Dodge early established a sawmill and handle factory, on Clesson's River, in Buckland, and a trip-hammer and forge were also operated there, while further down the stream Josiah Davis built a grist mill, in 1800, and thirty-five years later Abel Parker used the same power for a cloth dressing and fulling mill. Files, a patented brace and bit, and broom handles were manufactured in the town many years ago.

THE LAMSON & GOODNOW MANUFACTURING COMPANY

From scythe-snaths to table cutlery constitutes the story of one of the successful manufacturing enterprises of the Commonwealth—the Lamson & Goodnow Manufacturing Company, which began business at Shelburne Falls, in 1833, and which was incorporated in 1851 as the Shelburne Falls Manufacturing Company, and changed in 1853 to the Lamson & Goodnow Manufacturing Company, under which name it was incorporated two years later.

It was in 1833 that Ebenezer Lamson began producing scythes. Eleven years later he was joined by Abel F. and Ebenezer Goodnow, and the Lamson & Goodnow firm was formed.



EBENEZER C. LAMSON
of Shelburne Falls. One of the founders of Lamson & Goodnow's Cutlery Works, now the Lamson & Goodnow Manufacturing Company, of Shelburne Falls, manufacturers of fine table cutlery

In 1842 the manufacture of cutlery was commenced, butcher knives preceding the production of table cutlery, which continues to this day.

Ebenezer Lamson, was the son of Silas Lamson, inventor of the bent scythe-snath, all handles of scythes used previous to this fundamental change, which was affected about the beginning of the nineteenth century, having been of the straight type.

In the cutlery field, the company's "Anchor Brand" products are internationally known.

At the outset, the plant was located on the Shelburne side of the Deerfield River, but in 1850 buildings were erected on the Buckland bank, which were extended from time to time until the structures covered about two and a half acres, and all operations are carried on today in Buckland, although all mail for the company is received at Shelburne Falls.

When the concern began business the prejudices against American made cutlery had not been overcome, and for some years the services of only about forty men were required to meet the domestic demand. But ere long the introduction of machinery so improved the quality of the product that it stepped up its production by 1860 to a point where it was annually consuming 200 tons of steel, 18,000 pounds of ivory, 150 tons of ebony, 300 tons of rosewood, 300 tons of cocoa wood, 100 tons of grindstones, ten tons of emery, five tons of sheet brass and brass wire, and approximately 300,000 pieces of shin bone. The company then owned seven acres of ground, the main brick building being 208 by 45 feet, two

stories high, with a forging shop 128 by 45 feet, a polishing shop, 116 by 25 feet, a hand forging and tempering shop, 112 by 25, and small structures for the knife handle and finishing departments.

The concern markets $250,000 worth of products yearly, and with plant extensions made in recent years occupies two acres of manufacturing space. The company has capital of $381,500, was the first producer in this country to introduce the popular stainless steel type of table cutlery, and employs upwards of 200 operatives. C. L. Field is president and treasurer, E. R. Field, works manager and assistant treasurer, and H. G. Hoyt, vice president and sales manager. The directors are C. L., E. R., and S. F. Field, C. H. Keith and George C. Lunt.

More than half a century ago the Shelburne Falls Paper Box Works were founded by Elbridge Adams, and with the advent of the machine-box making era he sold the business to Henry A. Bowen, grandfather of the present owner, H. L. Amsden. The concern occupies a part of one of the buildings of the Lamson & Goodnow Manufacturing Company.

The Goodell-Pratt Company, operates one of its plants on the Buckland side of the Deerfield River, and the Ashworth Knitting Company manufactures knitted neckties in one of the buildings owned by the Lamson & Goodnow Manufacturing Company.

THE MANUFACTURES OF CHARLEMONT

Wool carding, scythe-snath, axe, hat, clothing, pottery, stove, grist and sawmills were operated in Charlemont in the last century, and wood-turning shops still flourish.

In 1892, Edward S., and George H. Frary, sons of H. H. Frary, removed the business established in Potsdam, N. Y., in 1862, by the late H. H. Frary, to Charlemont, where it has since been carried on. A few years later Edward S. Frary withdrew from the firm, and George H. Frary operated it until 1926, when the Frary Manufacturing Co. was formed, with F. Haviland Sibley, as president, and James D. Hanna, as treasurer. On March 30, 1929, the business was purchased by Harold T. Tudor, of Stamford, Vt., and the Charlemont plant is now operated by him under the corporate name of Frary Manufacturing Company, Inc., as a subsidiary of the Fitchburg Enamel Company, of Fitchburg, about sixty operatives being employed.

The founder, H. H. Frary, is said to have been the inventor of the first successful automatic wood-turning machine. For many years the wood-turned novelties produced at Charlemont were shipped throughout the United States, and to Canada and England, the company's specialty being fashioned largely from birch lumber.

About four years ago when George H. Frary retired from the active management of the firm bearing his name, H. H. Frary, his son, organized the Frary-Smith Wood Turning Company, which is a growing industry of the town. The partners are H. M., H. H., and G. H. Frary.

THE MOUNT PEAK MINE

The Mount Peak Mine, the remains of which may be seen from car windows south of the Boston & Albany rails, as trains pull out from Charlemont to the west, was operated from 1903 to 1910, and was tunnelled to a depth of 145 feet, between twelve and fifteen men being employed in mining iron. Almost the first ore removed revealed a nest of copper, which tested 13 per cent, and as the red metal was then selling for 27 cents a pound, this discovery proved profitable.

Charlemont also has talc within its domains and from time to time it has been mined, but the inaccessibility of the deposit renders the work unprofitable so long as other deposits more conveniently located hold out. Rock formation of a gold bearing nature exists in Charlemont and vicinity, and there are those who lean to the belief that gold in paying quantity will yet be panned in the brooks of Franklin and Berkshire counties. Samples of many interesting precious and semi-precious minerals are being constantly found from time to time in this section, and one resident of Charlemont makes a good income by prospecting and supplying museums and laboratories with samples of minerals and rare rocks found in that locality.

THE GRISWOLDVILLE MANUFACTURING COMPANY

The town of Colrain holds the honor of having had the first cotton mill erected in Franklin County. In 1814, W. P. Wing built a plant there which he operated for a number of years,—the predecessor of The Griswoldville Manufacturing Company.

At the age of twenty, Joseph Griswold, Sr., made a trip as far west as Detroit, Mich., and there saw sash, blinds and doors made by machinery. The operations so fascinated him that upon his return to Massachusetts he started a small plant in Ashfield, which he soon removed to Buckland, and, in 1828, to Colrain, where he found the power privilege on the North River to be to his advantage. For months Mr. Griswold toiled from dawn to dark erecting the factory buildings, which were largely built by his own labor, and it is related that while at work on his barn he carried from the ground to the roof of the structure in a single day 7,000 shingles which he laid before darkness fell. To doors, sash and blinds Mr. Griswold soon added the production of wooden boxes, for the manufacture of which he invented a machine to cut the product out of maple plank. Augurs and gimlets also were made at his lumber mill.

Four years after he started this enterprise, he became convinced that the time was ripe for a modern cotton factory in Colrain and he erected a plant, installed sixteen looms and the requisite machinery and turned out his first yard of cotton cloth—a product later to be famed the world over for purity and quality. Before the end of 1832 he had doubled the original equipment. Three years later he added to his water privilege and erected a brick mill, for which he manufactured the brick, and equipped the plant with 144 looms—a large number for that period. The name of Griswoldville Manufacturing Company was not adopted until 1835, and ten years later the concern was incorporated as such. The corporation prospered until 1837, but in the depression of that year it became financially involved, as did practically every other manufacturing enterprise in the country. Joseph Griswold, Sr., had fully established his integrity and his quality products with his creditors and customers and the former gladly came to his aid and enabled him to reorganize the cotton concern. A few years later his financial affairs were in such a favorable position that he was able to purchase all the stock of the company.

In 1846 the concern established its own commission house in New York City, a policy that at that period had been adopted by few Massachusetts textile units. In 1851 fire destroyed the plant at Colrain, but Mr. Griswold immediately rebuilt only to see the new factory lapped up by the flames five years afterwards. Undaunted, he erected a larger factory and installed 210 looms.

About 1865 Mr. Griswold, realizing that his market was outstripping

his facilities purchased the Willis water privileges in Colrain, and erected his second cotton mill, with the requisite tenement houses to accommodate his employees, and in 1874 he built a brick mill and brick tenement block, at Turner's Falls, cutting all the timber used in the structure on his own Franklin County farms which he had acquired, manufacturing all the lumber in his door, sash and blind factory, and making his own brick.

By that period he was paying more than 20% of all the taxes levied by the town of Colrain, where his two cotton factories, one in the village which bears his name and the other in Lyonsville, were located.

As the years passed, he gradually turned over the active management of his enterprises to his son, Joseph J., who succeeded him as superintendent, agent and vice president of the two cotton plants in Colrain and the Turners Falls Cotton Mills. The family is today represented in the management of the three plants, where 350 employees produce sheetings, gauze, buntings, interlinings and crinoline, Lorenzo Griswold being secretary of the corporation, which is capitalized for $592,500, and which still maintains its New York office, at 54-56 Worth Street. Another member of the family, H. D. Griswold, is the purchasing agent of the company and J. W. Ballard is president and treasurer, and R. L. Mogle is vice president. The present equipment of the Griswoldville and Lyonsville plants, in Colrain, consists of nine cards, 184 broad looms, 9,088 ring spindles, five boilers, three water wheels; and the company dyes, bleaches and finishes its fabrics. Sorbent gauze is the newest of the Griswoldville Manufacturing Company's standard products, and the concern markets it in attractive and convenient modern package form.

For more than a hundred years the town of Colrain has owed its success to the Griswold enterprises which during all this time have constituted the industrial life of the municipality.

THE PRODUCTS OF CONWAY AND DEERFIELD

In 1837 Edmund Burk erected a mill at Burkville, where cloth was produced, and in 1845 a tool company was established there, the plant being burned in 1851. Clapp's tannery flourished until 1869, when a freshet destroyed the plant. The South River Cutlery Company operated for a time in Conway, later removing to Winsted, Conn.

In 1904, Frederick W. Conant and Walter E. Donelson formed the firm of Conant & Donelson, and located in Greenfield, where they manufactured taps and dies, removing five years later to Conway, where they built a modern plant. Besides taps and dies, the Conant reaming machine for rebushing, iron-strap tighteners for packing cases, reamers, tap and reaming wrenches and bushing extractors, are produced by the firm.

The Conant & Donelson Company has capital of $80,000 and employs twenty-five hands. William T. Graves is president, Walter E. Donelson, secretary and Frederick W. Conant treasurer.

Between 1745 and 1794 Joseph Stebbins and Zadock Hawks operated tanneries in Deerfield, and Zenas Hawks continued the latter plant for a generation after the death of Zadock Hawks. Samuel D. Billings tanned leather until 1873 at the Bloody Brook factory. The first manufacture of haircloth in Massachusetts was started in Deerfield, in 1834, by Elias Willis.

THE ARMS MANUFACTURING COMPANY

In 1809, Denis Arms, from whom the Arms Manufacturing Company takes its name, began the manufacture of pocketbooks and purses in South Deerfield, and it is believed that he was the pioneer maker of such products

in the United States. Through all the intervening years descendants of the founder have been active in the firm's affairs, E. B. Arms, now president, being his grandson, and E. A. Rice, the treasurer and secretary, being a great-grandson. Two plants, employing 150 persons, located in Malden and South Deerfield, are operated by the company.

While cherishing its enviable history, covering a period of one hundred and twenty years, the Arms Manufacturing Company does not rest upon its laurels of yesterday, and is recognized as one of the most progressively managed concerns of its kind in the county. Today, in addition to marketing a complete line of pocketbooks and purses, it is manufacturing a variety of writing, stationery and playing card cases, and a varied assortment of most interesting novelties made of leather.

In 1869 Charles Arms employed twenty-four operatives in the manufacture of pocketbooks, the value of his product being $24,000 annually. L. S. Eaton produces $4,000 worth of the same commodities and North & Mishow turn out $1,000 worth a year.

The Harvard Pickle Works, Inc., whose main office is in Cambridge, operates pickling vats, in Deerfield.

The Old Deerfield Fertilizer Company, Inc., formerly the A. W. Higgins Company, Inc., capitalized for $100,000, employs twenty hands in manufacturing "Old Deerfield" fertilizers, C. F. Clark being president, and Ernest S. Russell, treasurer.

Pickle works, owned by D. M. Jewett, and the E. P. Swan Co., are also industries of South Deerfield.

THE ERVING PAPER MILLS

In 1905 an idle thousand dollars yearning for a profitable investment became responsible for a business which in less than a quarter of a century has grown to $570,000 in capital, and which gives employment to approximately sixty hands, who, with the assistance of modern machinery, turn out every working day of the week more than a million embossed and creped napkins, second sheets, colored envelope linings and a general line of machine glazed and cylinder tissues.

C. Elmer Pope, a man famous in his day as an inventor, and who, after years of constant endeavor, first succeeded in running newsprint at 1,000 feet every sixty seconds, found himself possessed, as he told the story, of an extra $1,000, to which he decided to add his mechanical and inventive ability, and engage in the manufacture of paper. Renting a small area, in Holyoke, he began the production of decorated crepe paper, napkins and colored tissue, and five years later the concern he founded moved to Erving, built a brick mill and a concrete dam, and, under the name of Erving Paper Mills, began operations with a capacity of four tons of paper a day. The business prospered from the start, and in 1917 a Yankee machine was installed, which stepped up production to twelve tons daily.

J. B. Rieg is president, and C. H. Waite, treasurer and secretary of this progressive concern which has become one of the mainstays of the town.

The Lindale Mills, in the village of Farley, are now operated by the E. A. McMillin Company, of North Adams. Years ago Joseph B. Farley, Dennis E. Farley and George E. Monroe built the plant for the use of the Farley Paper Company, which concern turned local spruce and poplar trees into pulp and paper. The building, erected on Millers River, is 368 feet long, and for years manila paper and wood pulp constituted the products. At one period E. N. Tolman operated a knitting plant in one part of

the mill, utilizing twenty Lamb knitting machines and turning out 120,000 pairs of mittens each year.

Today, this part of the plant is used by H. M. Sawyer & Son, of Cambridge, for the waterproofing processes of fabrics which are shipped to the main plant to be cut and made into garments.

The Lindale Mills manufacture boxboard which is largely used by the parent concern, at North Adams, although a part of the product is sold to other paper box manufacturers.

GREENFIELD—THE TAP AND DIE TOWN OF THE UNIVERSE

Greenfield's oldest concern traces its history back for a period of 181 years. In 1794 there was established in Northampton, the business which was consolidated with the Greenfield Baking Company, in 1908, and which is carried on under the name of the Smith, Carr Baking Company. The present factory is a brick structure, of two stories, containing 20,000 square feet, and thirty persons are employed in providing communities within a twenty-five-mile radius of Greenfield with fresh bread and biscuits daily, while a fleet of nine trucks is kept busy delivering wholesale orders.

The company's cracker business extends over the states of New York, Rhode Island, Vermont, New Hampshire and Massachusetts.

W. L. Phelps is president, John B. Martin, vice president, and L. A. Phelps, secretary and treasurer of the corporation, which has capital of $70,000 and annually markets bakery products valued at $200,000.

As early as 1784, Col. William Moore, who came to Greenfield from Rutland, erected a six story mill, which was devoted to flouring wheat. The building, because of its size and height, was one of the wonders of the locality. Moore also manufactured nails, tanned leather, prepared ginseng, ran a cooperage, a potash establishment, a slaughter-house, a tallow house, and two stores.

On January 16 and June 13, 1812, Morris B. Belknap, of Greenfield, was granted two patents on a machine, for cutting files and sickles, which could produce from five to six dozen twelve-inch files per day.

In 1832 the Greenfield Manufacturing Company was established, with $80,000 capital and manufactured doeskins. It used 170,000 pounds of wool a year, produced 140,000 yards of goods annually, and afforded employment to 120 persons.

THE CHARLES R. FIELD MANUFACTURING COMPANY

As early as 1835, J. P. Prentice built an improved baby carriage, which is now on exhibition in the Deerfield Museum, in Deerfield.

In all probability the beginnings of the manufacture of baby carriages in Massachusetts may be traced to the Franklin County town, for no mention of it has been found elsewhere at an earlier date.

For years prior to 1850, Greenfield had been identified with the making of baby carriages and of the hardware used in their construction. In 1855, Henry W. Warner was building children's and other carriages there and J. Morris Munson was manufacturing hardware for baby carriages in that town at the same period. Later, he discontinued his business, but Warner formed a partnership, in 1873, which resulted in the incorporation of the Warner Manufacturing Company. Joseph W. Miller was also an early Greenfield manufacturer of baby carriage material. In 1856, Charles R. Field, a son of Richard Field, who, as early as 1820, was building stage coaches in Greenfield, established a baby carriage business there

which was continued for forty years. Later, Mr. Field exclusively manufactured wheels and handles, shipping large quantities to manufacturers in the middle and western states, and today the Charles R. Field Manufacturing Company employs twenty hands in the manufacture of wood parts for baby carriages. John G. Strecker is president and E. W. Strecker is secretary and treasurer.

Other local manufacturers of baby carriages were Frank and Samuel Boylston, who were prominent in the industrial life of the town prior to the Civil War.

THE RUGG MANUFACTURING COMPANY

Amos Rugg began the manufacture of hay rakes in Montague, in 1842, and in 1889, the company which was even then known as the Rugg Manufacturing Company, suffered the loss of its Montague plant, and moved to its present location, in Greenfield.

In 1920 the business was incorporated as the Rugg Manufacturing Company, Inc., with a capital stock of $75,000, and at that period the corporation was engaged only in the manufacture of wooden hay and lawn rakes, and wooden and steel snow shovels.

In 1921, the corporation purchased the lumber business which had been conducted by K. L. Haskins and from that time on the business grew steadily until, in 1927, the total volume was five times that of 1919, and necessitated an increase of capital stock to $200,000.

At the present the company is the largest manufacturer of wooden hay and lawn rakes, and wooden and steel snow shovels, in the country, if not in the world.

Its products are exported to Australia, New Zealand, South Africa, Newfoundland, and many other foreign countries, thereby making the name of "RUGG" known throughout the world.

Several new items have been added to the production program, within recent years, particularly for children's use, including snow shovels and golf sticks. More than 175,000 of a single pattern of child's snow shovel were sold in 1928.

The concern employs seventy-five operatives, F. D. Rugg is president, S. U. Streeter, vice president, and Clarence D. Rugg, treasurer and secretary.

In 1854 the Greenfield Gas Light Company was established and was incorporated two years later as a public utility corporation. Its field of service includes Greenfield and Turners Falls.

B. B. Noyes began the manufacture of metal parts entering into the production of baby carriages, in 1865, and gradually other lines were added until today grey iron castings, patterns and special machines, kitchen hardware, and garden and floral tools are made at the plant of the B. B. Noyes Company, of which corporation M. T. Noyes is president and W. T. Noyes, is treasurer and secretary. The company added a large foundry to its equipment in 1912.

EMIL WEISSBROD & SONS

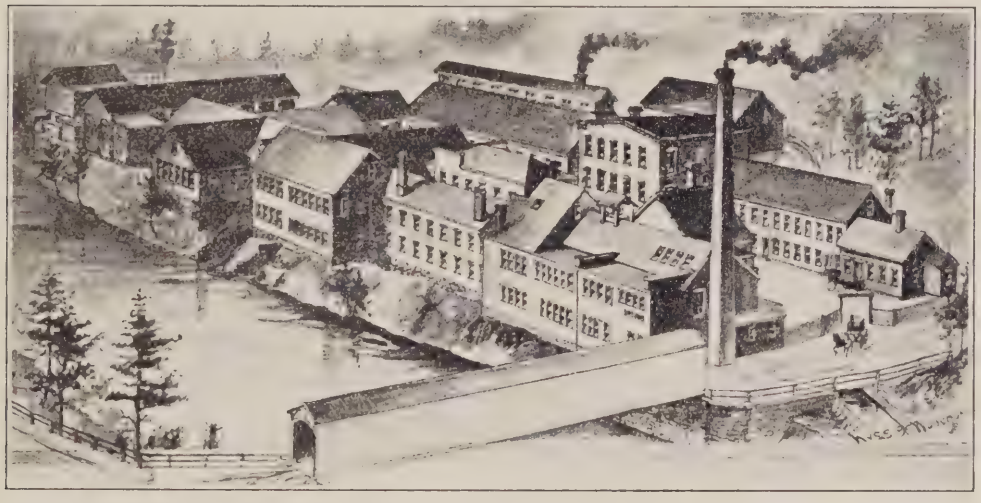
In 1870, Emil Weissbrod, a native of Saxony, settled in Montague, where he followed the trade of making pocketbooks, which he had learned in New York City. Starting with such production as he and his wife could manufacture, the business grew rapidly, and warranted the purchase of an idle school building, in Greenfield, in which he carried on operations until 1887, when he bought the Franklin County jail, and completely

transformed it into a modern factory. In September, 1890, his two sons, Willis H., and Carl J., became associated with him, and formed the firm of Emil Weissbrod & Sons, Inc., which today has capital of $150,000, and employs 100 operatives in the manufacture of the highest quality of pocketbooks, bill folds, and leather novelties. C. J. Weissbrod is president, W. H. Weissbrod is treasurer, and J. W. Manning is secretary of the corporation.

THE GREENFIELD TAP & DIE CORPORATION

The "tap and die town of the universe" is Greenfield, where annually more tools for the cutting of screw threads are produced than in any other town or city in the entire world.

How fortunate it was for the future of this grand old municipality,—one of the most beautiful in Franklin County, from the scenic standpoint,—that John J. Grant, a citizen of Northampton, in old Hampshire County,



OLD WILEY & RUSSELL MANUFACTURING COMPANY'S PLANT, 1888. NOW PLANT No. 1 OF THE GREENFIELD TAP & DIE CORPORATION, GREENFIELD

brought to Greenfield, in 1871, a new device which he had invented and patented, on October 24 of that year.

Nobody seems to know why he selected Greenfield in preference to his home town, but the fact remains that he started to manufacture his screw cutting bolt cutter with an improved form of die, in a part of what is now the B. B. Noyes factory.

Previous to that time, hand threaded bolts were produced by "worrying" the thread onto the rod with the old style "jam plate," which required rotating back and forth, squeezing and jamming the metal out of the grooves by an almost interminable process until finally a very indifferent and inefficient sort of thread resulted.

The thread in the tapped hole was also made in a primitive and crude way by the old form of blacksmith's taper tap. To fit a nut to a bolt was, therefore, not only a laborious process, but one that scarcely lent itself to Sunday School phrases, as the bolt thread had to be worked down to size by repeated manipulations of the jam plate, accompanied by imprecations savoring of strong language, until, finally, the nut and bolt came

together with some sort of a "fit," akin to the one into which the operator had thrown himself.

Mr. Grant's invention was a radical and revolutionary departure. The die was round and in two pieces, the halves being held by set screws in a collet and the adjustment for size being provided by two taper-headed screws. Its great advantage, however, lay in the fact that the die *cut* the metal instead of crushing it, and the thread was made to size in a single cut or "once over."

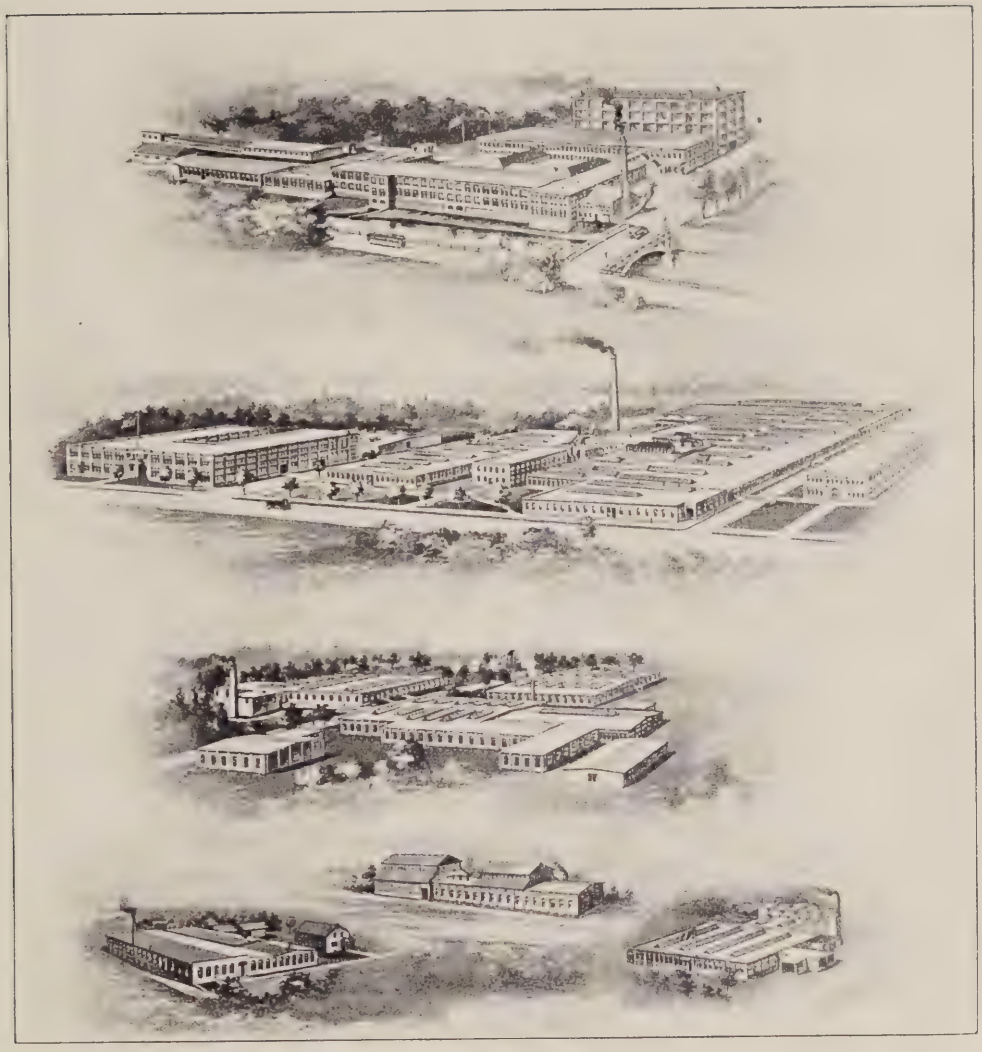
In April, 1872, Messrs. Solon L. Wiley and Charles P. Russell, of Greenfield, formed the firm of Wiley & Russell, and joined with Mr. Grant in the manufacture of tools under his patent. They removed the business to an old cutlery shop, on the west bank of Green River, where the present Wiley & Russell unit of the Greenfield Tap & Die Corporation, now stands.

Sales were slow, the price of the new bolt cutter being about $80, as compared with $5 or $6 which the blacksmith paid for the "jam plate" at that period. The Greenfield firm sought a way out of their dilemma and finally evolved a new form of die, which became known to the trade as "Lightning," and was fitted to a stock and worked by hand. An assortment of taps and dies, capable of cutting several sizes, was marketed in boxes, with the requisite die stocks and tap wrenches, the collection retaining the name, "screw plate," which has stuck till this day. While they succeeded in bringing down the price for a standard assortment to approximately $25 aggressive sales efforts were necessary, and Elisha Wells, of Greenfield, was hired as one of the earliest salesmen, the methods of distribution being somewhat different from those that prevail today. He started out with a stock of tools in a buggy, or sleigh, selling to blacksmiths along his route, and making trips as far west as Ohio and Michigan. Within two years after they began business, Wiley & Russell were employing forty men, and, in 1874, bought Grant's interest and patent, and changed the name of the concern to the Wiley & Russell Manufacturing Company.

Not until an order for $3,000 worth of products was received from the Simmons Hardware Company, of St. Louis, did the company enter the dealer field of distribution. For the moment, this order taxed the capacity of the plant, but it was promptly executed and from that time forward a wider dissemination of the products was secured, the sales spreading south and west, and then across the seas to Australia and South Africa. The concern purchased the automatic machinery and equipment of E. A. Goddard, of Essex, Conn., who sold taps in New York City, under the name of the New York Tap & Die Company. It also improved the "lightning" tap by evolving the machine relieved process by which the threaded portion of the tap was relieved back of the cutting edge to reduce friction and minimize breakage. Previous to that invention, tap relieving had been confined to the laborious process of hand filing, but the special machinery threaded and relieved the taps automatically.

In 1874, E. F. and V. J. Reece left the employ of the company and, under the name of Reece Brothers, began the local manufacture of the round table adjustable split die, which they had designed, and which, being the simplest of the adjustable dies, was widely copied and is in more common use today than any other form of die on the market. Thus their contribution to the screw cutting industry proved to be one of its substantial foundations.

In 1876, Frederick E. and Frank O. Wells, two other employees of the



COMPOSITE VIEW OF THE PLANTS OF THE GREENFIELD TAP & DIE CORPORATION, GREENFIELD

Upper picture: Plant No. 1.
Second picture: Left, The Administration Building; Center, The old Wells Bros. Co. plant now Plant No. 2; Right, Industrial Relations Building.
Third picture: Plants Nos. 3 and 4—The Pipe Tool and Machine Tool Units.
Fourth picture: Left, The Galt, Ontario, plant; Center, Plant No. 7, a drop forge unit at Turners Falls; Right, Plant No. 8, the box factory.

Wiley & Russell Manufacturing Company decided to branch out for themselves, and, with their father, Elisha Wells, located a small plant, on the Green River, near the old grist mill site. Under the firm name of Wells Brothers they began the manufacture of an improved form of die, which soon developed into the "Little Giant" type. It marked a forward step in the screw tool business, combining all the advantages of adjustability found in the previous product, and gaining solidity through the use of the bevel-sided die which fits into corresponding bevels in the collet which holds it, as well as possessing a guide which screws into place and forces the die-halves into their socket. Their plant was soon wiped out by fire, and for a time they occupied the basement of the B. B. Noyes factory until their structure could be rebuilt. In 1879, Franklin E. Snow became a member of the Wells Bros. firm, and, assuming charge of sales, soon extended the area of distribution until the products were marketed in practically every country on the globe.

In 1888 the concern moved to the present day Wells Brothers Company plant, and incorporated soon afterward.

Two years later, Frederick E. Wells retired from the corporation, and, with his son, Fred W., began the manufacture of pipe tools, the original item being the "Economy" pipe die, which consisted of two small steel plates, swaged together and fitted with small die lands of tool steel. Being greatly interested in economy of manufacture, the senior Mr. Wells made a study of the possibilities of drop-forging as related to taps and dies, and out of his investigations came several important contributions to the screw-cutting industry.

In 1907 F. E. Wells & Son Company bought the Automatic Machine Company, which had been organized to continue the manufacture of the line of speed lathes and cutter grinders previously made by Wells Brothers Company, and to develop an automatic screw machine.

The E. F. Reece Company (successors to Reece Brothers) combined forces with F. E. Wells & Son Company, under the latter name, in 1910. In 1906, A. J. Smart left the employ of the Wiley & Russell Manufacturing Company and, with his three sons, and Rollin S. Bascom, formed the A. J. Smart Manufacturing Company, and produced high quality taps, dies and screw plates.

Realizing the possibilities that appeared to exist in a combination of the interests of the several tap and die industries in Greenfield, Frank O. Wells and Col. Frederick H. Payne, the latter a native of Greenfield, but at that time prominently engaged in the banking business in Boston, brought about, in 1912, the organization of the Greenfield Tap and Die Corporation, which originally was a consolidation of Wells Brothers Company and the Wiley & Russell Manufacturing Company.

In October, of the same year, the A. J. Smart Manufacturing Company came into the organization and, in March, 1917, the acquisition of the F. E. Wells & Son Company plant was effected.

In 1913 a factory for the production of boxes for screw plates was built and, in 1917, the Nutter & Barnes Company, organized in 1887, at Hyde Park, to manufacture a line of metal cutting-off machines and automatic saw and cutter sharpeners, was acquired. This concern was later moved to Hinsdale, N. H., from which place it was removed to Greenfield, in 1917.

That year, the Bickford Machine Company, which was organized in 1908, by O. S. Bickford, an employee of Wells Brothers Company, and which later became Bickford & Washburn and finally the Bickford Machine

Company was added to the Greenfield Tap and Die group. It manufactured special lathes, screw machines, etc., and developed an excellent milling machine.

On July 1, 1920, there was acquired, through exchange of stock, control of the Lincoln Twist Drill Company of Taunton, which concern manufactured a line of twist drills and cutters, it being the belief of the Greenfield Tap and Die Corporation that such acquisition would round out its line and admirably supplement the taps, dies and other small tools which it was manufacturing.

In 1924, the machinery and equipment of the Lincoln unit were moved to Greenfield, since which time the manufacture of twist drills has been carried on there, and the line of cutters which it formerly made has been abandoned. About this time the peculiar trademark "GTD" was stamped on the goods, replacing the trademark "Lincoln," which had previously been used, and, in 1926, the Taunton plant was sold to the Taunton Rubber Company.

Early in 1921 the executives of the Greenfield Tap & Die Corporation became interested in a new type of internal grinder that had just been developed by Ralph L. Morgan, of the Morgan Grinder Company, of Worcester, which machine, it was thought, would fit in well with its line of machine tools, and on July 1, 1921, the Worcester unit was purchased. Shortly thereafter the machinery and equipment of the Morgan company were moved to Greenfield and consolidated with the manufacturing facilities there. On the same date (July 1, 1921), to supplement the Morgan product, the business of the Greenfield Machine Company was purchased. This concern manufactured a line of grinding machines, and the equipment of the plant was removed to the machine tool plant of the Greenfield Tap & Die Corporation.

In 1918 the company completed and occupied one of the finest administration buildings owned by any Massachusetts industry, the structure being 155 by 176 feet, two stories in height, and built of reinforced concrete.

For twenty-eight years the manufacture of gages has been an important part of the company's business, and during the World War developed very rapidly, because of the necessity of the production of highly standardized munitions. Concentration on the development of measurements and gaging systems met with great success at the Greenfield plant.

Gages were produced for foreign governments, as well as for the United States, for various types of munitions, such as shrapnel and high explosive shells, rifles and small arms, and a series of special gages was worked out for the United States Government.

A wide public service was rendered the country by the Greenfield Tap & Die Corporation in connection with the World War. Long before the United States entered the conflict, F. O. Wells foresaw the serious situation due to the lack of sufficient gages for production of munitions and he brought the matter vigorously before the governmental authorities. As a result, the Greenfield Tap & Die Corporation had the satisfaction of knowing that it had done much to secure the safety and success of our arms. Gages, of almost unbelievable fineness and accuracy, were manufactured by it with all possible speed for the Government's needs.

Concentrated effort was devoted to the nation's requirements above all else, and practically 100 per cent of the gage production, either direct or indirect, was for the Government, in 1917 and 1918.

For almost sixty years Greenfield has concentrated its industrial pro-

duction on taps, dies, gages, grinding machines, and small tool products of many kinds, until it has become a mechanically-minded center. Sons have followed their fathers in this industry, and there have grown up in that locality skilled artisans whose workmanship has become proverbial throughout the world. Scratch a buyer in Australia, Africa, South or Central America, China or Japan, and he will shout "GTD," for he, like the American purchaser, realizes that nowhere else in the land can he buy small tools of the quality that comes from the hands of the Connecticut Valley artisan.

It was a matter of common knowledge during the World War, that many contracts, originally placed by the Government with concerns in the Middle West and other parts of the country, had to be rescinded and ultimately given to Massachusetts and Connecticut manufacturers, because the accuracy, nicety, quality and refinements required in precision work could not be executed elsewhere.

In 1928, after ten years of research and experimentation, the corporation placed upon the market its new hydromatic internal grinder, which combines speed in operation with the absolute safety of the operator, and which also involves several radical departures from standard practice, chief among which is that the grinding wheel enters the work from the rear instead of the front.

Loading and unloading have always been regarded by mechanical engineers and practical machinists as constituting the neck of the internal grinding bottle. It has been the endeavor of the designers of the new Greenfield product to speed up loading and unloading, and thus enhance production. The work head of the new invention is directly in front of the operator in the most efficient position; there is no wheel to be avoided, or to force him to assume strained or unnatural positions in loading and unloading in order to avoid the menace of a swiftly whirring wheel in operating the hydromatic.

By actual test these features save from five to twenty seconds per cycle of floor to floor time, and with 85 to 100 loadings per hour, this economy in operation is important, while the device considerably reduces the actual grinding time.

The machine grinds to limits of two to three ten-thousandths of an inch on production jobs, and is economical of floor space and of power.

Measured by volume of production the company is but little below the wartime status, its manufactures in 1928 having exceeded those of any previous year, with the exception of 1918, 1919 and 1920, which represented a distinctly abnormal period.

The officers of the corporation, all of whom live in Greenfield, are: President, Frederick H. Payne; vice president and general manager, F. G. Echols; vice president in charge of sales, W. B. du Mont; treasurer, Frank A. Yeaw; assistant treasurers, Frederick E. Hawks and Leon W. Graham.

Col. Frederick H. Payne, president of the Greenfield Tap & Die Corporation, has repeatedly said, in public addresses, that if today his concern were located outside New England it would be forced to remove to some town or city in the Connecticut Valley if it desired to produce the highest quality of small tool products, because nowhere else in the United States is there obtainable the skilled workmanship found in this section of New England.

Today approximately 1,200 men are employed at the Greenfield plant, where almost $7,000,000 are invested in up-to-date factories.

ROGERS, LUNT & BOWLEN COMPANY

In February, 1882, George C. Lunt, now treasurer of Rogers, Lunt & Bowlen Company, entered the factory of The A. F. Towle & Son Manufacturing Company, in Newburyport, to learn the trade of a silversmith, and followed the new concern, formed in 1883, which was incorporated under the name of The A. F. Towle & Son Company, when it removed to Greenfield, in 1890, where a new factory was built and where R. N. Oakman, Jr., one of the stockholders in the new company, resided. Subsequently, Mr. Oakman was chosen president of the concern, and about 1898, when he became intensely interested in the "horseless carriage," as automobiles at that period were termed, he proceeded to engage in the manufacture of auto cars. Unfortunately, the bankers in the vicinity of Greenfield were not as far-sighted in those days as they are now, and they failed to grasp Mr. Oakman's enthusiasm, and his vision of the future development of the automobile industry, with the result that so much



SHOPS OF ROGERS, LUNT & BOWLEN COMPANY, GREENFIELD
Craftsmen in sterling silver

money was employed in producing the "horseless carriage" that The A. F. Towle & Son Company failed in November, 1900.

Mr. Lunt, who, at that time, and for a number of years before, had been an assistant to Mr. Oakman, was called upon to liquidate the silversmithing concern for the benefit of its creditors, and after that had been accomplished he formed, in May, 1902, the Rogers, Lunt & Bowlen Company, and purchased of the assignees of the defunct A. F. Towle & Son Company, its tools, machinery, trademarks, and good-will. In the intervening years the business done by the old concern, at the height of its prosperity, has been increased eight-fold, and the Greenfield company occupies between three and four times as much floor space as that used by the old concern.

Manufacturing sterling silver tableware only and making everything from the diminutive coffee spoon to the full size tea service and tray, the company's products are marketed in every town and city in the United States where reputable jewelers are located, and notwithstanding the slight reduction in percentages of business done in other industries, in 1920 and 1926, the Greenfield concern was able to increase its sales these years, and in 1928 they were in excess of those for the corresponding period of the year previous.

John E. Donovan is president, Charles H. Keith secretary, and George C. Lunt, treasurer, of the concern, which is capitalized for $300,000, and employs 175 operatives.

THE GREENFIELD ELECTRIC LIGHT & POWER COMPANY

Since 1887, when the Greenfield Electric Light & Power Company first sent its invisible current of light, power and heat, over its lines, it has had a steady growth. Through its hydro-electric station on the Deerfield River, it supplies electricity to a population of 40,000, of which about 11,000 are customers, and it serves thirteen towns, sub-stations being located at Bernardston, Northfield, South Deerfield, Millers Falls and Greenfield, the latter being the general distribution station.

The company is interconnected, through its transmission lines, with the Turners Falls Power & Electric Company, and also has the advantage of numerous interconnections with this company.

With its hydro-electric station, on the Deerfield River, together with its connection both underground and overhead to the various hydro and steam stations located on the Connecticut River, it is in a position to offer most desirable inducements to industries. These outer connections not only assure a rate that is in keeping with the demands made upon it, but also of a reliability of service that is highly advantageous. The corporation has capital of $300,000 and employs 125 operatives. George W. Lawrence is president, W. Rodman Peabody, vice president, F. Leslie Foss, clerk, F. C. Abercombie, treasurer, and Arthur G. Gibson, assistant treasurer.

THE PHENOMENAL GROWTH OF THE GOODELL-PRATT COMPANY

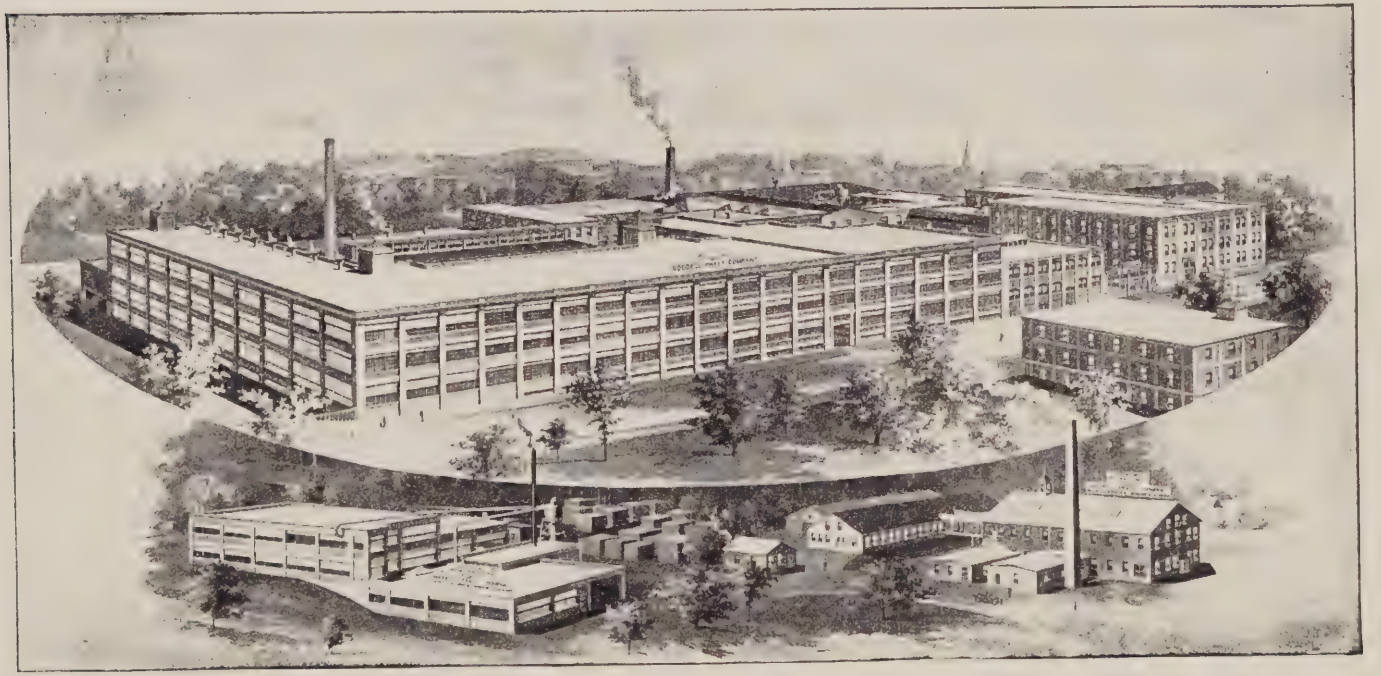
In 1888 two practical mechanics, the Messrs. Goodell, capitalized many years of experience in practical mechanical designing by forming the firm of Goodell Brothers, at Shelburne Falls, where they manufactured me-



ORIGINAL PLANT OF
GOODELL-PRATT COMPANY, GREENFIELD

chanics' hand tools, including automatic, hand and breast drills, drill chucks and automatic screw drivers, all of which were covered by patents, which, with the many improvements that have since been made, today form an important part of the line of products manufactured by the Goodell-Pratt Company, in Greenfield.

In 1892 the business was removed to the latter town, where it was conducted under the original firm name, although one brother had been superseded by another. Three years later the Goodell Brothers Company



PLANTS OF THE GOODELL-PRATT COMPANY, GREENFIELD

was incorporated, when one of the brothers withdrew from the concern, and, in 1897, upon the retirement of the remaining brother, the entire interest in the concern was taken over by the management which still controls the company. Two years later the name was changed to the Goodell-Pratt Company, which corporation conducts the business today.

Until his death, one of the Goodells was actively identified with the Goodell Tool Company, of Shelburne Falls, in which the Goodell-Pratt Company was a large owner, and the sale of whose products it controlled. Later the Greenfield corporation purchased the Goodell interest, and all the bit braces, rim wrenches, and glass cutters manufactured at Shelburne Falls were produced there until this type of production was consolidated and removed to the main factory, in Greenfield, in 1925.

Another member of the original Goodell Brothers Company, for many years manufactured mitre boxes, in Greenfield, as the Goodell Manufacturing Company, in which concern the Goodell-Pratt Company acquired an interest, and whose product it has sold exclusively since March, 1916.

In order to have a line that it would be practically impossible for any other manufacturer to duplicate, the Goodell-Pratt Company organized, in 1900, the Massachusetts Tool Company as a Precision Tool Department. For many years this unit was located in the company's yard and was controlled by it. This concern purchased the old Coffin & Leighton Company, one of the first makers of tempered steel rules in this country and the inventors of the end graduation on steel rules, as well as of an excellent method of graduating them. To make this line more complete the Goodell-Pratt Company purchased the Lavigne Micrometer Company, of New Haven, Conn., owners of a large number of ingenious micrometer patents. The precision tool department for some time has been incorporated within the main Greenfield factory and has grown to large proportions.

A few years later the Goodell-Pratt Company purchased the business of C. F. Richardson & Son, of Athol, thereby gaining the experience which that concern had accumulated in the manufacture of iron levels for many years. Starting in where the Athol unit left off, the Greenfield corporation developed a fine line of these tools, which was later supplemented by the purchase of the Stratton Level Company, manufacturers of the very highest grade of wooden spirit levels. The Stratton business dated back to the early '70s and it was generally conceded that the concern made the best level ever put on the American market. One of the primary reasons why the Goodell-Pratt Company purchased the business was that the corporation's executives believed it should be perpetuated, and that its experience should not be lost. In 1913 this business was installed in a department of the Greenfield factory, specially constructed for manufacturing levels of high quality. Since that time considerable equipment has been added to this department and a number of improvements have been made in the levels.

Shortly afterwards the Goodell-Pratt Company purchased the business of Ducharmes & Company, long located at Shelburne Falls, and known as manufacturers of high-grade hammer-forged screw drivers, awls, punches and other small tools. Factory No. 2 was built at Greenfield for the exclusive use of this unit. Recently an addition was made to this plant, to accommodate the department, in which all of the wooden handles are turned and polished.

The latest acquisition was the purchase, in 1925, of the electric drill department of the A. F. Way Company, of Hartford, Conn., which was

immediately moved to Greenfield. Plant additions were made to accommodate the production brought from Hartford.

The phenomenal growth of the concern is attested by its catalogues. The original edition contained forty pages, and enumerated less than eighty tools. Its latest edition contains 400 pages, and describes upwards of 2,000 tools—and all this in a little more than a quarter of a century.

In 1897 the Goodell-Pratt Company carried less than twenty people on its payroll. Today it has 400 and is capitalized for $2,100,000. Originally carrying a very few accounts on its books, it now has a list of over 10,000 customers, and its goods are being regularly sold in every civilized country on the face of the earth, with the possible exception of Greenland.

During the past year its Greenfield factories used thousands of tons of steel, thousands of tons of pig iron, hundreds of tons of malleable iron, and proportionate quantities of other material. It required a million boxes of wood and pasteboard to pack the tools manufactured by it during this period. This total applied to a line of fine tools means vastly more than when employed in packing a staple commodity.

The company operates a second factory at Shelburne Falls and branch offices and stores in New York, Chicago and London, England, while personal representatives of the concern have offices all over the world.

William M. Pratt is president, and John E. Donovan is treasurer and secretary, of the corporation.

The Goodell Manufacturing Company is a local subsidiary of the parent concern, has capital of $45,000, and employs twenty-five hands in the production of mechanics' tools. William M. Pratt is president, and P. E. Fay treasurer and secretary.

CHAUNCEY WING'S SONS

To the Town of Greenfield come the publishers of some of the world's periodicals of the greatest circulation for devices which are indispensable to them in mailing their magazines.

In 1894, the late Chauncey Wing, in coöperation with James A. Horton, a local printer, connected with the *Greenfield Gazette and Courier*, invented and patented a label-addressing machine for newspaper and magazine publishers, and began the manufacture of the devices, the former taking care of the production department and the latter assuming charge of sales. In 1908, Mr. Wing became the sole owner, and ten years later his sons, Henry C. and Howard E. Wing, took over the business and incorporated Chauncey Wing's Sons. Since the original patent was granted, several more have been secured, covering the design of these unique and serviceable machines, which enjoy a world-wide distribution. Shipments are made to every country on the globe, while in the United States the vast majority of publishers use this type of machine.

Among the early customers of the Wing Label Pasting Mailers was the Curtis Publishing Company, of Philadelphia, which has continued the purchase of them since they first appeared on the market, and most of the prominent publishing houses constantly employ the devices.

THE NEW ENGLAND BOX COMPANY

When you see a box or crate containing Gorton's fish, Cliquot Club ginger ale, Moxie, Father John's medicine, Kibbe's candies, Indian motorcycles, Handy's chocolates, Goodell-Pratt's tools, L. C. Smith & Bros. typewriters, Hercules powder, Valentine's valspar, Winchester shells, or one of a thousand other well known commodities, you gaze upon a product

manufactured by the New England Box Company, whose main headquarters are in Greenfield. Containers for the above and hundreds of other well-known American concerns flow from the fourteen plants of this corporation.

The original merger included the plants of Ansel Dickinson Sons Company, of Greenfield, the Winchester Box Company, of Baldwinville, and the National Box & Lumber Company, of Orange, and despite the fact that it was not until 1889 that the New England Box Company came into corporate existence, it has grown from its original size to fourteen plants, located in Baldwinville, Cambridge, Chelsea and West Springfield, in this state, with two in Ashuelot, two in West Swanzey, two in Keene, N. H., and one each in Winchester and Concord, N. H., and Wilmington, Vt., in which upwards of 1,500 operatives are employed.

Its main object during this period has been to afford the user of boxes, crates, tubs and pails a wholly adequate source of supply capable of meeting every demand that can be put upon it, and to provide box engineering skill that can be applied to the reduction of the costs of the manufacturer. It has developed and is cultivating and using today 60,000 acres of box-timber reserves, thus saving its customers the long haul and high transportation charges reflected in the cost of boxes made from the diminishing natural timber grown 3,000 miles away, and at the same time insuring constant replacement of raw material consumed.

These forest reserves, the only ones of their kind in this section of the United States, are located in such a way as to be independent of one another, thus reducing the fire hazard to the minimum and guaranteeing uninterrupted production from the forest as a whole.

Each serves one of the fourteen large mills, that are located convenient to the market, thus again shortening the road to the user, affording combinations of railways and highways that preclude transportation tie-ups, and making certain that fire, strikes, blizzards and floods will not interfere with a dependable flow of containers at all times.

One of the fourteen mills is reserved for rush orders, and ordinarily provides 24-hour service on carload lots. This foresight of the management enabled it to provide Jell-O, one of its customers, with an increase of from six to seventeen carloads of containers a week on one week's notice. A 24-hour service for the manufacture of samples is regularly maintained by the concern. Modern dry-kilns are operated at three separate plants, and at all fourteen a large lumber supply is carried in the yards at all times.

High-speed, self-feeding presses for printing on wood, either in black or in color, exactly as printing is done on paper, are available, in each mill, for every possible need.

Fancy polished hard-wood boxes, are designed and built at the West Springfield plant, which was acquired, in 1921, at which time a new factory was built there. The company's line ranges from the tiny boxes which were manufactured to carry each single Lexington-Concord souvenir half-dollar, without room to spare, to immense cases that hold automobiles and tractors entering the export trade; in quality, from crates designed for common farm tile to the polished, lined and upholstered containers of confectionery, high-grade tools, and costly solid silver, and in exactness, from a dry-goods box to one designed to house a storage battery, or the delicate instruments of a radio set.

The company's specialists, skilled in the principles and technique of box construction, and equipped with facilities for applying them, designed

the small-arms cartridge case adopted and used by the United States Government for the cartridges of General Pershing's army in the World War.

While it is still necessary for the company to buy in the open market nearly 50 per cent of the lumber it uses each year, this requirement is being reduced as rapidly as additional reserves can be located, purchased, and given over to scientific cultivation.

Under this policy the time is not so far distant when the cultivated forests of this one corporation will more than replace the demands made on them, thus guaranteeing to the user of its commodities a source of supply for box materials that will last as long as the country itself.

Every purchaser of the commodities fashioned by this Franklin County concern is doing more than obtaining containers in which to transport commodities. He is coöperating in building up these timber reserves and insuring for himself and his successors a permanent supply, at reasonable prices of one important factor in the problem of distribution, on the solving of which his profits more and more depend.

On April 29, 1925, at the Forest Products Laboratory, at Madison, Wis., a plywood box, made by the New England Box Co., was packed with 283 pounds of dry goods, and subjected to the severe "Drop test" for comparative strength. In this test a huge revolving steel drum fitted with various obstacles and "hazards" subjects the boxes to every imaginable fall, shock and blow, at all angles. After 400 "drops" the testers abandoned their efforts to break the box, its contents being still undamaged and intact.

The company's Chelsea and Cambridge plants are known as the Atwood & McManus Division, and manufacture shooks, bottle boxes and lock corner boxes catering particularly to the eastern part of Massachusetts and serving Boston and its vicinity.

The plants at Baldwinville, Mass., and Ashuelot, N. H., are lock corner mills, which can if necessary produce shooks and nailed up cases.

The Winchester plant is a large lock corner mill serving carload trade. It also manufactures resawed hardwood and pine wirebounds and small lock corner fish boxes in large quantities.

At West Swanzey one of the two local plants is a small lock corner mill making high grade boxes with partitions, slide covers, and inserted bottoms and special work, while the other specializes in pails, buckets, kits, cannikins and tubs.

One of the Keene mills manufactures lock corner shipping containers in large quantities and battery and mitre boxes, while the other, a new department, produces a fancy finish box.

The Concord plant manufactures shooks and the larger size lock corner shipping containers, also bottle boxes in large quantities. This is a comparatively new mill and modernly equipped throughout.

At Wilmington, Vt., is located the Deerfield Plywood Division, where veneer wirebounds and plywood shooks are manufactured. This mill was completely rebuilt in 1927, and is especially adapted to hardwood veneer manufacturing. Although it did not begin operations until January, 1928, in a year's time the volume of production there reached $25,000 a month.

SOME RECENT DEVELOPMENTS

Most manufacturers are now educated to the economies and are familiar with the uses of the wirebound box. The plywood shook is a more recent development in the container engineering field. It is made of veneer, either single ply or three-ply of various thicknesses. Each veneer face

is cleated. The box is shipped knocked down and assembled by the user in much the same manner as ordinary shooks. It is light in weight which saves freight, quite rigid and strong and by far the dressiest looking container in the market. Northern hardwood secured from beech, birch or maple is used for the veneer in these plywood cases. Northern hardwoods are known to produce stronger veneer than Southern gum which gives a decided advantage to the company over Southern competitors, for while their prices are usually lower on the same thickness of veneer, due to labor conditions, the strength of the northern veneer is such that the New England Box Company can cut the thickness to meet their price and still produce a plywood case which is as strong as the Southern gum of a greater thickness, if not actually stronger.

Textile manufacturers are rapidly adopting plywood cases. Standard Electric Time Company and the Dennison Manufacturing Company are large users of these types, favoring them because of the tightness, neatness, lightness and ability to carry a heavy load.

The Fancy Box Department at Keene, which was started early in 1928, produces finished containers of all descriptions, the main feature of which is the stucco finish of any color applied to a wooden box and then the application of a gesso design of any description applied to the stucco. Being a new vogue many difficulties of production and selling had to be met.

The manufacturers of papeteries are now boxing many of their writing paper lines in these fancy boxes. Silverware manufacturers are finding a large use for them for many of their items. All kinds of finishes can be accomplished with this stucco and gesso work.

The corporation, which has capital of $1,400,000, is managed by the following officers; chairman of the board of directors, Julius G. Day; president, Charles H. Keith; vice presidents, La Fell Dickinson, A. B. Atwood, I. F. Atwood, and H. P. McManus; treasurer, W. E. Dickinson; assistant treasurer and sales manager, Nathan Tufts; secretary, Wm. Scott Keith.

OTHER GREENFIELD INDUSTRIES

In 1906, Francis C. Crowningshield began the manufacture of vises for drill presses and milling machines, and special machine and tool building. The firm is now Miller & Crowningshield.

In 1908, W. H. and C. F. Ulrich bought the business which had been established in Hoosick Falls, N. Y., in 1890 by B. F. Miner and which was moved to Montague, in 1900, and brought it to Greenfield, where The Toiletine Company was incorporated, and where manufacturing operations have since been carried on. Among the articles produced are Toiletine, a lotion, and several medicinal preparations. W. H. Ulrich is president and treasurer, and C. F. Ulrich, secretary of the concern.

In 1908, O. S. Bickford established a jobbing and repair business which became a partnership that year when Howard L. Washburn entered the firm, and in 1909 Bickford & Washburn, Inc., was formed, the name subsequently being changed to Bickford Machine Company. In 1916 a new factory was occupied and eighty-five men were employed. In 1920 the concern became the Bickford Switzer Company and three years later the concern was sold to the Wells Manufacturing Company, and Mr. Bickford erected a two-story cement building, where he and his son, Robert, and a son-in-law, Howard Carrier, operate the firm of O. S. Bickford & Son.

THE MINOTT PRINTING & BINDING CO.

The maternal mandate "either go to work or go to school," provided the seed for the founding of one of Greenfield's progressive industries, when Charles F. Minott chose the printing business as the alternative in lieu of school, he secured a job in a small printing office, in Springfield. A number of years later while superintendent of a large printing establishment, in Boston, he was asked to take over the job department of an established weekly newspaper, in Greenfield, and removed to the latter town, on April 20, 1911. Quickly sensing the inadequacy of the local equipment, and noting that large buyers of quality printing were placing their orders in cities a hundred or two hundred miles away, he established the Minott Printing & Binding Co., on March 1, 1912, and equipped his plant with the latest and most up-to-date machinery he could purchase.

Inducing his son, Ivan, then in Chicago, to join him, the concern speedily built up a large business, and in the spring of 1927, the senior Mr. Minott retired and the son became the sole owner.

In line with the times, Ivan Minott secured the services of Bolton M. Young as advertising and sales representative, and manufacturers with merchandising and sales problems that come within the scope of direct mail selling have since been assisted in working them out.

Mr. Minott has added more automatic equipment to that originally purchased from his father until the Minott Printing and Binding Company is one of the best equipped plants in western Massachusetts. A diversified line of accounts is handled including small tools, saws, blankets, mackinaws, sweaters, metal signs, taps and dies, electrical equipment, monuments, shovels, mailing machines, silverware, chairs, wood-working machinery, gears, school books and others. Charles F. Minott is president, Ivan C. Minott, treasurer, and Maurice J. Levoy, secretary.

THE RUSSELL MANUFACTURING COMPANY

The forebears of the Russells of the present Russell Mfg. Company were pioneer manufacturers of western Massachusetts, and since late in the eighteenth century their descendants have been engaged in industrial pursuits in Greenfield.

About 1795, John Russell, the great grandfather of the Russells of the present generation, settled in the town and established a jewelry business, which included gold and silversmithing. In 1834, his son, John, later associated with his brothers, Nathaniel E., and Francis, founded the John Russell Cutlery Co., the pioneer manufacturers of cutlery in this country. With the development of water power at Turners Falls, three miles distant, the concern moved there, where it is still located. Today, it is one of the largest producers of cutlery in the United States.

In 1872 Charles P. Russell, a nephew of the John last mentioned, established the Wiley & Russell Mfg. Company. He was the pioneer manufacturer of the modern screw plate, which produces a perfect thread at a single cut, and which supplanted the slow and inaccurate "jam plate" then in use for cutting screw threads by hand. The screw plate he produced utilized, for hand work, the accurate dies which had been used previously in machines only. These screw plates soon became an important item of commerce, and the making of them has been the principal industry of Greenfield ever since that time. They are now being produced in various forms by not less than ten different manufacturers in this

country. After building up a very successful business, he retired with a large fortune in 1912.

In 1913, his two sons, Charles C., and Whitman invented and patented an improvement on the established styles of screw plates, and incorporated the present Russell Mfg. Company, their invention covering double-reversible dies, which have two sets of cutting edges capable of performing double the work of the old-style type. The sales of the company in 1928 were practically 30 per cent larger than those of any year since the slump of 1920, and large shipments of the products are made regularly to all parts of the civilized world.

The company is capitalized for $100,000, and employs upwards of 100 operatives. Whitman Russell is president, and Charles C. Russell, secretary and treasurer of the corporation.

Since its reorganization in 1916, the Greenfield Paper Box Company has shown an encouraging increase in its business. The concern produces set-up boxes and finds its largest customers among the various tap, die and tool industries which occupy such a prominent place in Greenfield and nearby towns. The partnership consists of Charles H. Slocumb and Theodore B. Wolcott.

In 1917 a group of Greenfield men purchased the grinding, polishing and finishing business of John C. Blevney, of Newark, N. J., and moved the equipment to a new and partially completed plant, in Greenfield, where manufacturing operations began shortly after January 1, 1918.

In 1919, the concern was incorporated as the Production Machine Company, and since that time the line has been developed and extended to a position where today it manufactures and distributes the most efficient and fastest operating polishing machines on the market for cylindrical finishing. Its customers include some of the largest manufacturers in the country, the products not being confined to the metal trades, but running the gamut from iron, steel, brass and copper to rubber, fibre and wood. The company maintains a Chicago office, and a representative in Indiana, and is capitalized for $400,000.

W. S. Howe is president and treasurer, A. H. Behnke, vice president, and W. V. Ellis, secretary and clerk.

In May, 1925, the Threadwell Tool Company was established, purchased the long-established business of the American Tap & Die Co., and engaged in the manufacture of taps and dies, including ground thread taps, mechanics' hand tools, including Stillson wrenches, try and mitre squares, and hack saw frames. The concern owns a number of important patents covering these items and maintains sales offices in New York, Chicago, Detroit and Milwaukee, and its salesmen cover the entire United States and Canada. Recently valuable connections abroad have been made. Specializing in supplying taps suited to the requirements of quantity production, its customers include the General Motors Corp., the Ford Motor Company, and the American Car & Foundry Co. Enjoying a steady growth since its inception, the 1928 sales volume was the largest in its history, and the number of employes has practically doubled, upwards of 100 operatives now being carried on the payrolls.

Otto Kolstad is president, W. S. Keith, treasurer and secretary, Charles H. Keith, vice president, and Louis E. Peck, sales manager, and the corporation has capital of $125,000.

Robert E. Pray & Co., owned by Robert E. Pray, employs thirty operatives in the manufacture of bricks and annually produces 4,000,000.

The Bicknell-Thomas Company manufactures tapping machinery. L. E. Turner is president and treasurer and H. M. Darling, secretary.

The Franklin County Lumber Company, with capital of $44,600 of which Maurice Demond is president, and R. N. Demond, treasurer, produces builders' finish and employs twenty-five operatives.

The Greenfield Steel Stamp Works, Inc., moved from New York City to Greenfield in 1922, the concern having previously been known as the New York Stencil Works. Offices are maintained in New York, St. Louis, San Francisco and Chicago and 10,000 square feet of floor space are occupied in making parts for small special machines and all makes of typewriters. The concern now produces about 70 per cent of all the steel stamps used in the United States, and does a considerable export trade. P. L. Van Alystyne is president, W. L. Nason, secretary, and C. W. Peoble, treasurer.

T. Morey & Son carry on composition, electrotyping and printing. The Wells Manufacturing Company, owned by F. O. Wells, succeeded the Wells Corporation a few years ago, and is engaged in the production of a general line of motor-driven sharpening devices for use in factories, stores, hotels, restaurants, and clubs. Elisha Wells, father of F. O. Wells, was employed in the John Russell Cutlery Company's plant as long ago as when it was located in Greenfield, and prior to its removal to Turner Falls, while the son entered the employ of Wiley & Russell, in 1874, and two years later, with F. E. Wells, formed the firm of Wells Bros., afterwards absorbed by the Greenfield Tap & Die Corporation.

On May 1, 1929, the Flatbush Gum and Confectionery Company, of Brooklyn, N. Y., which had been in business in that city for fifteen years, began operations in Greenfield, where it acquired a ten years' lease of the upper floor of the Aird-Don Company's building. The Flatbush concern manufactures gum for slot machines and popular-priced confections, and its annual sales are $250,000. It is now occupying 10,000 square feet of floor area and employing thirty-five operatives. J. D. Graves is president and general manager.

HAWLEY, LEVERETT AND MONROE

Grist mills, a furnace and forge, a tannery erected by Austin Pease, in 1835, and operated by Howes & Sears until it was abandoned in 1855, and sawmills, and wood-turning shops, were included in Hawley's industries of the last century.

The partnership established, in Leverett, by Charles H. Beaman and Ormas C. Leverett, under the firm name of Beaman & Marvell, was changed to a corporation in 1913. The concern is engaged in the manufacture of lock corner boxes, and employs thirty-five operatives, being capitalized for $50,000. C. H. Beaman is president and treasurer, O. C. Marvell, vice president, and C. L. Putney is secretary of the present-day Beaman-Marvell Company.

Following the early saw and grist mills built in Monroe, came the tannery, established before 1800, by Asa Foster; the fulling mill, erected in 1808, by Ebenezer Nims; the sixty spindle mill built by the Messrs. Gleason after the War of 1812, where satinets were produced; various wooden-ware shops, whose products were sent as far as California; the washing of gold from the sands in local placer mines, and the production of cut nails by Erastus Gleason and others.

In 1887, James Ramage, of Holyoke, erected a plant at Monroe Bridge, for the manufacture of pulp and manila paper, under the name of the

James Ramage Paper Company, with capital of $500,000, the pulp unit having a capacity of five tons per day, and the paper mill six tons a day.

The plant was recently operated by the Deerfield Valley Paper Company, which had capital of $650,000, and employed 125 operatives, or more than twice the number carried on the payroll of the Ramage concern, and which manufactured kraft wrapping paper. It came into possession of the Deerfield Glassine Company a few years ago, and now produces a new type of paper recently introduced in this country. The new corporation has capital of $560,000 preferred and 30,000 shares of no par common stock, and employs 150 operatives. Joseph H. Wallace is president and general manager, William G. Shortess, vice president, F. E. Greenwood, secretary, and William L. Ross, treasurer.

THE INDUSTRIES OF TURNERS FALLS

It scarcely requires explaining that the falls constitute the reason for the existence of Turners Falls. Capitalizing the cataract on the Connecticut, Turners Falls has become, in a little more than a half century, not only a thriving and prosperous manufacturing town, but the power center of western Massachusetts.

It may truthfully be said that it is one of those big little places whose importance is in inverse ratio to its population. If by some cataclysm of nature it should suddenly cease to exist, all of western Massachusetts as far south as Springfield would sit in darkness, countless wheels of industry on the Connecticut would be idle, and large consumers of essential products would feel the effects for a long time to come.

Although the Falls were known 250 or more years ago and were regarded by the Indians as a mecca in the salmon and shad fishing seasons they were designated for many years by the outlandish name bestowed by the Redskins, who called them Peskeompskut, which, being interpreted meant "the place in the river cleft by a great rock"—an adequate description but a terrific jaw breaker for a Yankee to pronounce.

In 1676 William Turner, of Boston, led a small band of settlers of the western reserve on a surprise visit to the Indians encamped at the falls, and although appearing as an uninvited guest he all but annihilated them, in the name of God and the colonists. At any rate his name became embalmed in aqua pura, for ever since the locality has borne the name of Turners Falls, and happily the apostrophe was omitted by the pioneers and has been non est ever since.

But nothing of moment immediately following this seventeenth century foray and it was not until 1798, in the era of river navigation, that the falls, being considered a menace to the boats that then traversed the bosom of the Connecticut, were provided with a dam, which turned some of the water into a canal.

These agencies—the dam and canal—for fifty years thereafter carried on a very prosperous business, and served the community well until the building of the Connecticut River Railroad to Greenfield in the '40s, brought about a revolution in transportation methods.

From that day until the Civil War the locks and dam lapsed into a state of decay, while the canal bed grew a luxuriant acreage of brush.

Familiar with what had been accomplished at Lowell, Lawrence, and Holyoke, Col. Alvah Crocker, of Fitchburg, whose outstanding monument is the Hoosac Tunnel, marshaled his vision and enterprise into an appreciation of the potential possibilities of a similar development at Turners Falls, and through his friend, Wendell T. Davis, of Greenfield, secretary and treasurer of the old Locks & Canals Co., secured control of the stock

of the old corporation, and organized the Turners Falls Company, as the corporate successor to the "Proprietors of the Locks and Canals of the Connecticut River," which had been incorporated February 23, 1792, the change of name being authorized by the Massachusetts Legislature, in 1866, when the capital of the company was fixed at $1,000,000. The new corporation erected a dam 1,000 feet long, with an extreme fall of forty-one feet, which permitted the development of 30,000 horse power.

It is somewhat significant that he attracted as four of the original stockholders of the new corporation a quartet of men who later served the people of the Commonwealth as their governors—Hon. Alexander H. Rice, who was the chief executive from 1876 to 1879; Hon. Thomas Talbot, who served from 1879 to 1880; Gen. Benjamin F. Butler, who occupied the chair from 1883 to 1884, and Hon. Oliver Ames, who was governor from 1887 to 1890.

In 1866 the company was relieved of the obligation to maintain the canal for navigation purposes and was empowered to build and maintain a dam and canal, and lease or sell the use of water for power purposes.

The dam that was erected was the fourth built in practically the same location, since 1793. Upon its completion mills began to appear along the banks almost over night, as the locations afforded exceptional power facilities.

The first hydro-electric power house was erected by the Turners Falls Power and Electric Company in 1902, and transmission lines were put in operation in 1913, followed by the erection of the Cabot power station in the following year, the present capacity being 73,000 horse power, which is distributed to users in Hampden, Hampshire, Berkshire and Franklin counties. The corporation ranks as one of the largest single hydro-electric power developers in New England.

The Turners Falls Power & Electric Co., besides having large hydro-electric developments on the Connecticut River, is interconnected with the New England Power Associates and the Hartford Electric Light Company, through transmission lines, assuring its customers in western Massachusetts of an adequate supply of power at all times.

It employs 175 men and has branches at Greenfield, Springfield and Boston. George W. Lawrence is president, Alvah Crocker and W. R. Peabody vice presidents and Fred A. Abercrombie treasurer and secretary. The corporation has capital of $10,000,000 and employs 200 persons.

THE JOHN RUSSELL CUTLERY COMPANY

John Russell, of Greenfield, born in 1799, was the first manufacturer of cutlery in the United States. Prior to his entry into this field, he had been engaged in his youth in silver-smithing and gold-smithing, but later went to Georgia, where he speculated in cotton and from 1824 to 1828 accumulated a fortune and decided to retire from business. In 1832 he and his wife returned to Greenfield, the home of his youth, for a visit. While there his family persuaded him to remain, and he finaly concluded to enter some kind of business, and built a stone and brick plant on the banks of Green River, being his own architect and engineer, and there began the manufacture of chisels and other edge tools.

He suffered a loss by fire, which, however, was not severe enough to delay his project; and later a spring flood wrecked his buildings, dam, canal and bridge, which proved discouraging but not disheartening. Russell rebuilt, and was joined by his younger brother, Francis, a merchant, who took charge of the sales and opened a clearing house for the product

in New York, thereby enabling the firm to sell directly to its customers instead of consigning the goods to commission houses.

In 1834 he began, on a small scale, to turn out table cutlery—the first attempt to introduce this business in America. Lacking skilled workmen, the experiment seemed foredoomed to failure, but Mr. Russell was a man of business capacity, firm decision and high integrity, and it was not long before he was able to convince domestic purchasers that his product was as good as that imported from Sheffield, England. Hand operations were first employed, the only machinery used being emery wheels and grindstones for finishing the blades. Mr. Russell soon introduced a trip hammer, for forging the blades—a purely American improvement on English production.



JOHN RUSSELL
Founder of the John Russell Cutlery Company, Turners Falls

The cutlery industry prior to the establishment of his Green River Works was mainly in the hands of English manufacturers, with its center at Sheffield. The product was the result of piecework and was done by hand, the Sheffield workmen carrying on their trade in their homes. Russell, with true Yankee ingenuity, brought about a radical change in the industry when he established his water-driven plant on the banks of Green River.

He imported his raw materials—steel, emery, grindstones, ivory, bone, horn, brass, wire and ebony—in sufficient quantities to keep his factory in operation for a year at a time and paying much higher wages than the English cutlers, he soon drew to his plant not only some of the best workmen in Sheffield, but German craftsmen as well.

The practice of parceling out the work in Sheffield made the American system impossible for English manufacturers to adopt at the time, hence the Green River Works passed far ahead of foreign competitors both in quality and quantity of their wares, and in a comparatively short period assumed the lead in the manufacture and distribution of cutlery the world over.

One device followed another until by the '60s machinery entirely supplanted hand work, many inventions of Matthew Chapman being purchased by the Russell concern. Forks followed knives and long before the '70s the John Russell Cutlery Company, at its Turners Falls plant, was consuming 36,000 pounds of ivory a year, 112,000 pounds of ebony, 57,000 pounds of rosewood, 305,000 pounds of cocoa-wood, 600 tons of

steel, and utilizing annually 400,000 pounds of grindstones, 44,000 pounds of emery, 3,000 pounds of beeswax, 25,000 bushels of charcoal, 2,000 tons of anthracite coal and 700 horse-power in its processes, as well as a large amount of silver in plating blades and handles, while it then enjoyed transportation facilities through the medium of a branch railroad three-quarters of a mile in length, and as early as 1871 its annual sales were $1,500,000.

The company's contribution to the settlement of the western frontier of this country was consequential, inasmuch as most of the hunting knives with which the pathfinders were armed were manufactured in John Russell's shop. They were a distinctive model and were to the western slope what bowie knives were to the settlers of Texas. Between 1840 and 1860 upwards of 60,000 of these hunting knives were sent west, the favorite type having a straight six inch blade, and a straight handle, either of cocobolo or ebony, while the more expensive knives were equipped with ivory or rubber grips.

During the highly picturesque period of the opening of the Far West in the two decades preceding the rush to the California gold fields in 1849, travelers venturing into the wilds of the plains country and the Rocky Mountain region often wrote thrilling narratives of their experiences. In many of these are descriptions of the appearance, customs and accoutrements of both the white trappers and the Indian hunters. One of the tools or weapons that appeared to have intrigued the fancy of those observers and which was mentioned more specifically than any other was the "Green River" knife.

Almost from the time of the establishment of the factory, knives bearing this stamp found favor on the frontiers of the United States. Many different forms were made, but of all the types that known as the "Dadley" was the most favored by white hunters and trappers. This blade is supposed to have been designed by a frontiersman whose name it bore and was in great demand among both Indians and white men of the upper Missouri country from 1835 to about 1860.

Nor were the knives used solely as a part of hunting equipment. The plains Indians often removed the blades from their haftings and reset them in warclubs, making ugly-looking and no doubt highly effective weapons. There are several clubs of this type in museum collections.

By 1846 the fame of the Green River blades had spread throughout the Rocky Mountain region. The mountain men, or free trappers, used the name of the Green River knife as a standard of quality of anything traded, from a horse to a trap. Anything done "up to Green River" signified that the action was perfectly satisfactory. On the other hand, the cry of a trapper in a fracas, or "fofarraw" as the mountain parlance had it, "Give it to him, up to Green River!" had quite another signification. Knives were the handiest means of settling disputes, and since the brand of the company was stamped on the blade not far from the hilt, the meaning of the expression is obvious.

Ruxton, mentioning the Green River knife, says: "For as may be imagined, a thrust from the keen scalp-knife by the nervous arm of a mountaineer was no baby blow, and seldom failed to strike home—up to 'Green River' on the blade." In a footnote the editor of the book, commenting on the use of the term Green River, has this to say:

"The knives used by the hunters and trappers are manufactured at the 'Green River Works' and have that name stamped upon the blade.

Hence the mountain term for doing anything effectual is 'up to Green River'."

And so these famous old knives, produced in John Russell's shop, played no little part in carving out the wilderness beyond the Mississippi. Few articles of the old-time Indian trade have had such a romantic and prosperous history as these blades.

And today, the company's sphere of usefulness is not only in lonely camps and wild places, but in the kitchens and on the dining tables of the world.

In keeping with the cry for color, the concern produces handles in a variety of pleasing shades. The blades and tines are of shimmering stainless steel that keeps its brightness for a lifetime and in accord with the latest in design. In fact styling to meet the artistic taste and changed requirements of today's housewife is an ever-present trait in every Russell knife and fork. And the quality of workmanship and concept is such that it has even enhanced the prestige of the trade name.

The constant search for "something better that lies ahead," the belief that there are always peaks beyond, is an evidence of the youthful spirit of this very old firm. Modern methods of merchandising, modern methods of manufacture and modern advertising have made the company's product as highly prized by the dainty housewife of today and by the professional users of knives as it was by the rough hewn pioneer of yesterday.

Mr. Russell, the founder, retired from the concern in 1868, and died six years later. The plant was removed from Greenfield to Turners Falls, and as long ago as 1868 the firm of J. Russell & Co., Green River Works was changed to a corporation under the name of the John Russell Manufacturing Company, which, in 1873, upon reorganization became the John Russell Cutlery Company, the cognomen it has borne ever since.

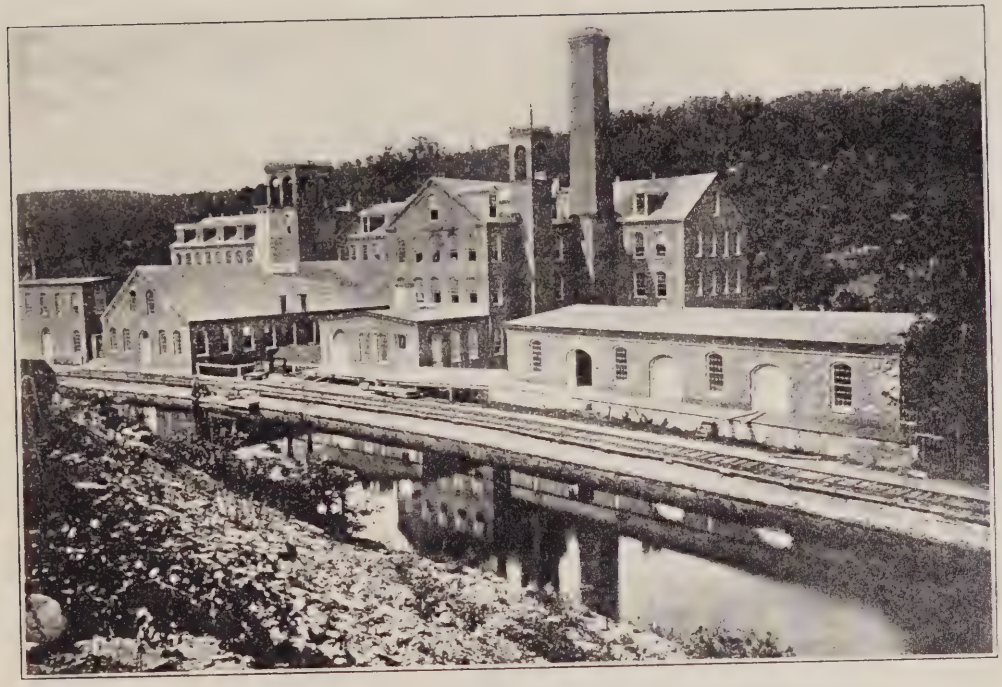
Today not only table cutlery is produced, but pocket-knives as well. The concern employs upwards of 250 operatives, has capital of $600,000 and maintains a New York office. L. D. Bement is president, C. E. Hazelton treasurer and secretary and L. Ewing assistant treasurer.

THE INTERNATIONAL PAPER COMPANY

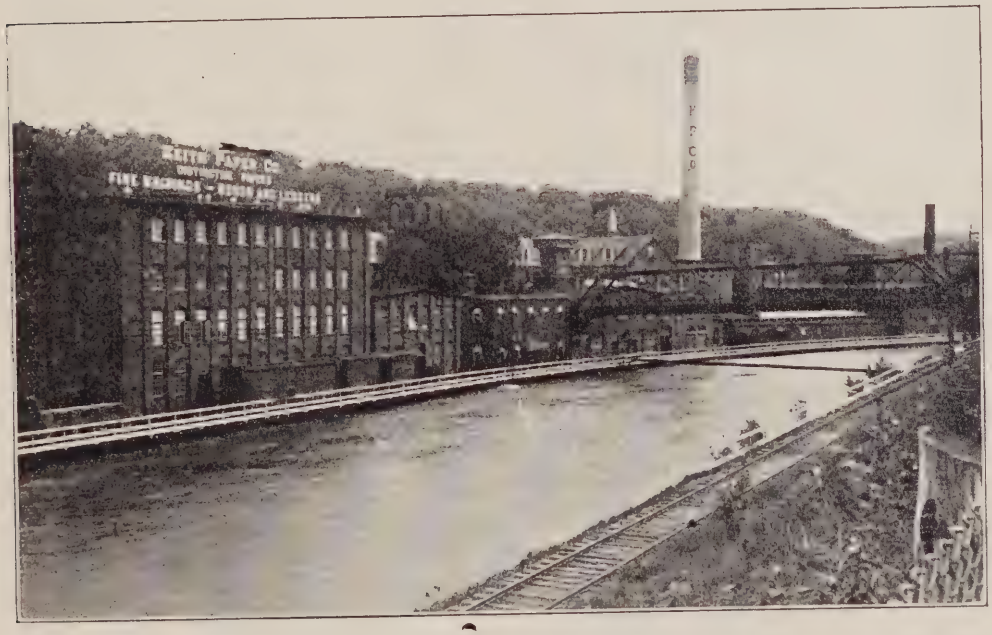
The Montague Paper Company, the corporate predecessor of the present Turners Falls plant of the International Paper Co., bears the honor of being one of the first paper units in the United States to engage in the manufacture of ground wood pulp.

An elderly German, named Burkhardt, had been experimenting in that line at Curtisville, N. Y., for some years and desiring financial aid to further develop and extend his ideas, he became connected with Albrecht Pagenstecher, of New York, and these two men, with Col. Alvah Crocker, arrived in Turners Falls one day, in the fall of 1868, and decided upon the location of the pulp mill, just above the site of the John Russell Cutlery Company.

The Turners Falls Company granted the promoters power at a low price as well as a large quantity of it because in the first instance an income was desired as soon as possible and in the second place it was thought at the time that the supply of water in the Connecticut River was inexhaustible. An additional inducement was that on the banks of the river just above the dam and on the plains, there appeared to be an inexhaustible supply of poplar trees. At that period it was thought that only poplar wood could be used for pulp, it being free from gum and possessed of a long fibre. It was believed that this local source of supply



ORIGINAL PLANT, KEITH PAPER COMPANY, TURNERS FALLS



KEITH PAPER COMPANY, TURNERS FALLS, 1928

of wood, with what would be drawn in by the farmers from surrounding towns would keep the mill running for all the years to come—but the end soon came, and George E. Marshall, who was in charge of the Montague Paper Company, found that under certain treatment, spruce wood could be used, and soon he had arranged for a supply to be floated down the river from Northern Vermont and New Hampshire. As compared with the amount of wood used then, it is interesting to note that the quantity of wood now used annually by the mills of the International Paper Company, for pulp purposes, is approximately one million cords.

The first buildings of the present Turners Falls plant of the International Paper Company, erected in 1871, contained ground area of 15,100 square feet and floor space of 43,710 square feet. Additions made from time to time gave a ground area of 43,540 and floor space of 188,700 square feet.

THE KEITH PAPER COMPANY

On August 29, 1871, John Keith, a man of magnetic personality, strong character and high principles, proceeded to bring into actuality the plan he long had cherished, of establishing a paper mill, the product of which would set a standard of excellence for writing papers, and on the site he had selected at Turners Falls work on a two-machine mill was begun.

The incorporators of the Keith Paper Company were Edwin Bulkley, Alvah Crocker, Wendell T. Davis, William C. Dunton, B. N. Farren, John Keith and A. Pagenstecher, and the first board of directors included: Edwin Bulkley, Thomas G. Carson, Alvah Crocker, B. N. Farren, and John Keith. The latter was elected president and treasurer and upon his death in 1886 he was succeeded as president by Alexander Hamilton Rice, who, in 1855, was mayor of Boston, and who, in 1874, was chosen as governor of this Commonwealth. Serving until his death, in 1895, he was succeeded by Albrecht Pagenstecher, who occupied the presidency until his death in 1927.

From 1871 to October, 1908, Charles M. Burnett was the treasurer and general manager, holding these positions for thirty-seven years, and being succeeded by James F. Bush, who served until January 1, 1912, when Alfred R. Smith was chosen as his successor, and holds these offices today. In 1893, the mill was enlarged to a four-machine plant. From the beginning the company has secured its water power from the Connecticut, and its water for manufacturing purposes from springs in the hills some three miles from the plant.

During recent years, the company's power plant has been completely remodeled, and power is now developed from one modern I. P. Morris hydraulic turbine of 1,300 horse-power capacity. This new unit is directly connected with a General Electric generator of 937 kilowatt capacity. This unit is relayed with a 750 kilowatt General Electric steam turbine, providing a total power capacity of approximately 2,500 horse-power.

With these modern and efficient improvements the Keith Paper Company is in a splendid position to maintain its traditional standard of quality.

The corporation has capital of $1,050,000, and employs 400 operatives.

THE GRISWOLDVILLE MANUFACTURING COMPANY'S LOCAL PLANT

When Joseph Griswold, of Colrain, in 1874, decided to erect a plant auxiliary to the main unit, in Griswoldville, he removed temporarily to

Turners Falls, and assumed oversight of the construction of a brick mill 250 feet long, 72 feet wide and four stories high, with an ell 100 by 50 feet, three stories high, in which he installed 12,000 ring spindles and 324 looms, power being provided by two horizontal water-wheels which furnished 400 horse-power.

Today the plant is equipped with 23,592 ring spindles, twenty-seven cards, and 305 looms, and, in addition to the water wheels it uses electric power, and employs seventy-five operatives in the production of sheetings, bunting, interlining, crinolines, and gauze.

THE MONTAGUE MACHINE COMPANY

Forty years or more ago Clark & Chapman established a small machine shop at Turners Falls on the site now occupied by the gate house of the Turners Falls Power and Electric Company. This partnership was succeeded by Clark's Machine Company, which continued in business until the turn of the century. A general jobbing business was carried on and gradually several defined lines emerged. These were fostered and developed by the Turners Falls Machine Company, which succeeded Clark's Machine Company in 1901. Prominent among the products were the Crocker hydraulic turbine and the Crocker rotary fire pump, both of which were designed and invented by W. O. Crocker. When, owing to the construction of the gate house it became necessary to move the plant, a new and larger machine shop was built a hundred feet or so to the south, and in 1908 the Turners Falls Machine Company was purchased by the International Paper Company, for use as a central maintenance plant for its various mills, the location for such a purpose being excellent, as most of the company's paper plants were situated in New England at that period. Most of the lines previously built were dropped and the name of the unit was changed to the Montague Machine Company. The purchase of the concern by the paper corporation offered facilities to develop new ideas and inventions for use in paper-making. After a few years larger quarters became necessary and in 1921 a modern plant, especially designed and equipped for work in that field of production was built at the opposite end of the town. The purpose of this new plant remains unchanged but it became the established policy of the concern that after any new piece of machinery for the making of pulp and paper had been perfected it should be placed at the disposal of the industry as a whole. As a result of this broad plan the paper-making machinery built by this company is being used to an ever growing extent wherever paper is made.

Surely the charge that Massachusetts concerns are on the decline does not fit the operations of this concern, which, in 1927, had its banner year for production. It was in that year that it designed, manufactured and installed in the Three Rivers, Canada, plant of the International Paper Company, the largest wood pulp grinding machine ever built in the world.

The company has its main office at 100 East Forty-second Street, New York City. Allen Curtis is president, Owen Shepherd treasurer and J. E. Waterhouse general manager of the corporation, which employs 150 operatives.

THE ESLEECK MANUFACTURING COMPANY

Less than three decades ago, the late Augustin W. Esleeck bought the plant of the Marshall Paper Company, at Turners Falls, and in 1901 incorporated the Esleeck Manufacturing Company, made plant additions and improvements, and began the manufacture of copying tissue paper.

Production had scarcely begun when the vertical filing systems came

into vogue, and gradually letter-copying books were discarded, resulting in a greatly reduced demand for the type of paper then being turned out by the company.

But Mr. Esleeck promptly met the situation by producing a light weight, strong, durable paper for use in preparing the duplicate forms so essential to the conduct of modern business, and realizing the possibilities of the development of form work, he decided to specialize in the manufacture of high grade rag content onion skin and manifold papers.

From a small beginning, the business constantly increased, with the result that from time to time it has been necessary to make additions to the original mill. The papers made by the company are accepted as standard in their respective grades and are marketed exclusively through wholesale paper merchants, its 200 distributors being located in all of the important centers throughout the United States and Canada.

Even though the product is high grade, and therefore meets with strenuous competition from cheaper papers in foreign countries, the export business, which a few years ago was nil, is gradually increasing.

Owing to the strength, appearance, light weight for mailing, and minimum bulk for filing, the papers manufactured by the company are now being used for thin letterheads, for records and forms, especially in connection with air mail, branch office and foreign correspondence.

The output has grown to 12,000 pounds per day, and the company employs 180 operatives, the average period of employment of which is ten years for each worker.

Irving N. Esleeck is president, W. H. Wood is secretary and F. R. Andrews treasurer of this $600,000 corporation.

THE M'LANE SILK COMPANY

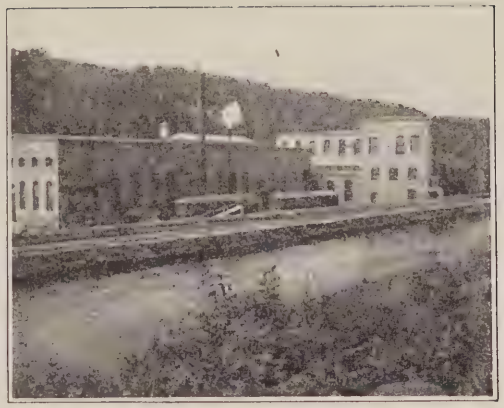
Following a service of many years as general superintendent of the William Skinner & Sons plant, in Holyoke, F. A. McLane came to Turners Falls in 1914, and established the first unit of the McLane Silk Company. The following fall, E. L. Taber, now treasurer and general manager of the firm, entered the company as an assistant to Mr. McLane.

The business developed to such an extent that in 1916 an addition which doubled the capacity of the plant was built to the weave room. The management has kept abreast of milady's demands in broad silks, with the result that the firm is rated today as one of the most successful and progressive of the broad silk industries of the country. In 1928 it disposed of its Scranton, Pa., unit, and concentrated all production in the Turners Falls plant, where sixty operatives are employed.

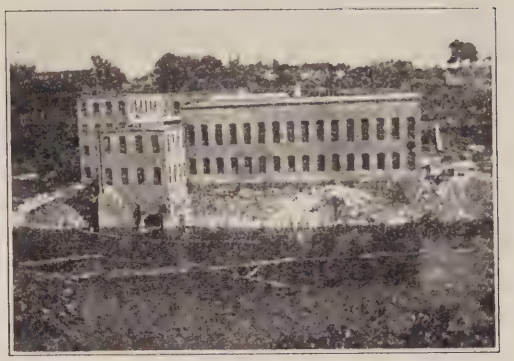
W. T. Ellis is president and E. L. Taber treasurer and secretary. The corporation has capital of $398,800.

THE MARTIN MACHINE COMPANY

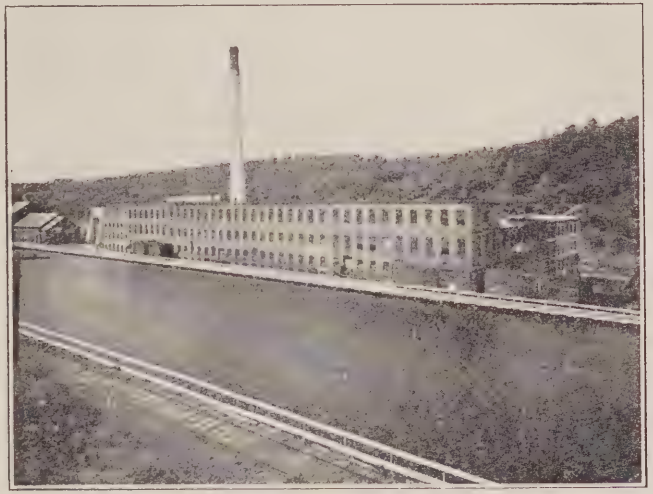
The Martin Machine Company was formed by F. J. Martin, in 1916, and began the manufacture of a special roll-type hydraulic marking machine, in Greenfield, that year. While it was the intention of the founder to conduct a small machine shop, the perfecting of an idea on a marking machine made it necessary to seek larger quarters with the result that a section of the John Russell Cutlery Company plant in Turners Falls was leased in 1918 and is still occupied by the concern. In addition to the manufacturing of the machines, dies for the impressing of trademarks, names, numbers, etc., on metal products are made by the company.



FRONT VIEW, ESLEECK MANUFACTURING COMPANY, TURNERS FALLS, 1900



REAR VIEW, ESLEECK MANUFACTURING COMPANY, TURNERS FALLS, 1900



FRONT VIEW, ESLEECK MANUFACTURING COMPANY, TURNERS FALLS, 1928



REAR VIEW, ESLEECK MANUFACTURING COMPANY, TURNERS FALLS, 1928

The firm is now employing fifteen persons, is capitalized for $37,400, and has the following officers: F. J. Martin, president; W. T. Ellis, treasurer, and G. E. Wheeler, secretary.

THE MONTAGUE ROD AND REEL COMPANY, OF MONTAGUE CITY

Fifty years ago when the firm of Bartlett Brothers, then engaged in painting bridges, bought a plant in Amherst, owned by Joseph G. Ward, nobody had the ability, or the temerity to peer into the future and acclaim the fact that then and there was born the largest concern in the world engaged in manufacturing all types of fishing rods, including those fashioned of native and foreign woods, of Japanese, Chinese, and Indian bamboo, as well as of split bamboo.

For thirty-five years prior to that year, fishing rods had been made at the Amherst plant, but it was not until 1880 that the split bamboo type was manufactured in any quantity. Three years later the partnership was dissolved, Eugene P. Bartlett purchasing the interest of his brother, Leander L., and continuing the management of the Amherst factory, while the latter returned to his home in Montague City where, two years later, he interested Charles W. Hazelton and B. N. Farren, a wealthy contractor, who spent his summers in the town, and who completed the famous Hoosac Tunnel, in forming the Montague City Rod Company, to manufacture fishing rods and other wooden products. Special machinery was built to work split bamboo, and the new concern early assumed a leadership in the fishing rod industry that has never since been questioned.

The corporation formed by these three men in 1885, with $21,000 capital has grown until today its successor, the Montague Rod and Reel Company, has capital of $600,000 preferred and 20,000 shares of common stock of no par value.

In 1889, four years after the original company was incorporated, the Amherst plant of Eugene P. Bartlett was acquired, and the next year Thomas H. Chubb, who had been manufacturing fishing tackle for many years at Post Mills, Vt., sold his business to the Montague City Rod Company, thus enabling the latter concern to manufacture its native wood products, in its own mill. In 1893 the rod business of the Malleson Rod and Reel Company, of Brooklyn, N. Y., was acquired, and five years later the reel department of the same concern was purchased, which permitted the Montague concern to provide the tackle trade with a large portion of its requirements.

In 1922, when Leander L. Bartlett died, the presidency passed to Eugene P. Bartlett. Up to that year, E. P. Bartlett had been in charge of the Pelham plant, Charles A. Powell had been superintending the operations at the Post Mills unit, and Thomas E. Malleson had managed the Brooklyn plant.

Upon the death of E. P. Bartlett in 1925 a reorganization became necessary in order to settle his estate, and the following year Charles W. Schuler, who had been associated with the concern since 1888, became president, and is at present the executive head of the concern. W. Bruce Pirnie, of Springfield, is chairman of the board of directors, and Raymond P. Bennett, who became assistant to Mr. Schuler in 1925, has since become assistant treasurer and a member of the executive committee. Previously connected with the New Departure Company, of Bristol, Conn., the Marlin-Rockwell Company, of Plainville, Conn., and the Canadian General Electric Company, of Toronto, Can., Mr. Bennett brought to the Montague concern a wide experience in factory management.

Wesley C. Roche, formerly manager of the Cross Rod Company, of Lynn, and William C. Bleloch, of Philadelphia, who possessed a background of nineteen years in the sporting goods business, were secured as salesmen. Arthur A. Rice, who succeeded E. T. Hart in caring for the far west trade of the concern, had had fifty years of experience in marketing fishing tackle.

In 1927-28 the Montague Rod and Reel Company began its first major effort to nationally advertise its goods, an extensive and successful campaign being carried on in the leading magazines to acquaint the public and the trade with the "Montague" branded rods and reels, and in 1928-29 this was continued even on a larger scale.

In 1928 the Montague Rod & Reel Co. purchased the controlling interest in the Montague Oar & Paddle Corporation, which had been formed to take over the assets of Smith & Parker, Inc., of Foxboro. The oar corporation manufactured the well-wnown "Ted Shea" oars and paddles, used by 95 per cent of all college crews and boat clubs in the United States and Canada, as well as by the United States Navy. In the Olympic races of 1928, Montague oars took four firsts and four second events, every contestant from this country being equipped with the company's products.

The Montague commodities now permeate Europe, including the Scandinavian countries, Germany, France and England, are largely marketed throughout Canada, and more than 90 per cent of the American trade has accepted the trade mark line of goods put out by the corporation, which has simply emphasized Massachusetts products and has proven that it is more profitable for it to sell a branded line, rather than one that is unknown. Upwards of 350 operatives are now engaged in the company's four plants.

FROM CLOTHES WRINGERS TO MECHANICS AND CARPENTERS TOOLS

In the early '60s, Messrs. Levi H. Gunn and Charles H. Amidon began manufacturing clothes wringers at Greenfield, and in 1865 an improved bit brace was made, which became known to the trade as the Barber Brace, until, today, all leading American tool makers, whose production embraces this device, include in their line a brace known as the Barber pattern. This factory was burned in 1868, and that year Henry L. Pratt became interested in the growing concern. Upon his suggestion the plant was removed to what at that period was known as Grout's Corner, but which later became Millers Falls. Here a most excellent water power privilege existed on Millers River, about a mile from the spot where the waters of the stream mingle with those of the Connecticut, and that year the Millers River Manufacturing Company was incorporated with Mr. Pratt as president, and a one-story brick building, 250 feet in length and fifty feet wide, was built, which was enlarged from time to time.

E. P. Stoughton was appointed director of sales and the business soon served a world wide market. He is now serving as chairman of the board of directors and it is to his constant fostering of export opportunities that the company's prominence in its field of production is due. In 1876, George E. Rogers entered the company as its secretary, later becoming successively the treasurer, vice president and general manager. It was he who urged the absorption of the Langdon Mitre Box Company in 1906. Mr. Rogers always possessed a rare understanding of his fellow men that enabled him to furnish inspiration to his subordinates and to impress his individuality upon the company. In 1872 the Backus Vise Company at

Windsor, Vt., was acquired and the name of the consolidated corporation was changed to the Millers Falls Company.

From that year rapid progress was made in expanding the number of lines of tools made. Until manufactured by the corporation, nobody had conceived of a hand drill, but today the concern makes a complete range of these tools that meets every requirement, and the same may be said of its breast drills, while its Langdon and Langdon Acme mitre boxes are known throughout the world.

The company has always been regarded as the pioneer in the distribution of hack saw blades. It was in 1880 that the first American-made hack saw blade was produced, and in the intervening half century the Millers Falls Company has made rapid strides in this field. In 1920 the corporation acquired control of the West Haven Manufacturing Co., of West Haven, Conn., makers of the Universal hack saw blade, and it now markets that product under the Millers Falls and Universal brands. The same year the Millers Falls Company absorbed the National Machine Company, of Brattleboro, Vt.

During the past ten years the Millers Falls Company has pursued an aggressive policy in the development of new lines of tools and has added complete sets of ratchet and spiral screw drivers, levels, hack saw blades, automobile jacks and electric tools, together with many other miscellaneous items.

In 1929 a complete new line of bench and block planes was placed on the market, and a conspicuous example of the company's progressiveness is observed in the development by the engineering force of a way to use high-speed steel in hole saws. Tests are said to have proved that the cutting speed of hole saws has been improved 100 per cent while their life has been prolonged twelve-fold.

In the evolution of the hand tool business there has followed a steadily increasing demand for tools which operate electrically and it seemed a logical step for the company to develop an electric tool line consisting of electric drills, screw drivers, grinders, etc., which now promises to be the leading activity of the Millers Falls Company, in the years to come.

Production of these devices was begun experimentally in 1927, and was carried on intensively the following year. The first year's participation in the electric tool field was so favorable with promise for the future that various new items went into the company's electric sales program for 1929, and it became necessary to form a new corps of salesmen to take care of this department.

Although the majority of concerns in the United States devoting themselves to the manufacture of hand tools are said to have experienced a slackening of business during a good part of 1928, the Millers Falls Company was enabled to report a substantial increase over 1927, and the outlook in 1929 was considered extremely bright. Company officials foresee further expansion and gains in the hand tool business, exceeding the progress made within recent years. Its electric tool business, though still in its infancy, shows promise of occupying a position well toward the top in its field within the near future. The company's export business is reported as growing steadily, with no indication of a let-down.

The officers of the company, realizing the importance of the advice offered by the United States Department of Commerce, along simplification lines, began in 1926 to talk to hardware merchants about greater concentration of effort. Through advertising and through printed leaflets

stress was laid on the savings to be effected by avoiding unnecessary duplications and by purchasing of trustworthy establishments. This campaign is said to have been mutually beneficial to the company and the trade.

Within recent years the company has thoroughly reorganized its plants, and has erected many new buildings until today the total floor area at Millers Falls exceeds ten acres, not including many additional acres at the West Haven and Brattleboro units. All hack saw blades, band and hole saws are produced at West Haven, and the commodities manufactured at the Brattleboro unit are confined to automobile jacks.

The remaining twelve major tool lines, including all electrical devices, automatic tools, levels, mitre boxes, braces, planes, hand drills, auger bits, expansive bits, nail sets, and punches are manufactured at the main plant in Millers Falls.

Its products are sold through the hardware, mill supply and automotive trades and the company has developed complete distributing connections in almost every foreign country. The corporation employs upwards of 600 operatives. Philip Rogers is president, George U. Hatch, vice-president in charge of sales; John W. Smead, vice president; Earl D. Holtby, treasurer, and Edward P. Stoughton, chairman of the board.

THE MILLERS FALLS PAPER COMPANY

Another twentieth century enterprise came about through the business acumen and vision of a group of Holyoke men who, perceiving the advantages of the fine water power and railroad facilities at Millers Falls, added to these important factors their own experience in manufacturing and merchandizing paper, and formed, in 1902, the Millers Falls Paper Company. The group was headed by Edward P. Bagg, president of the Parsons Paper Company, of Holyoke, and associated with him were others who were closely identified with that successful concern.

Success attended the enterprise from the start, and, in 1908, the original equipment was expanded. Today the company operates two ninety-inch Fourdrinier machines, which run twenty-four hours a day, exclusively on high-grade, rag-content papers, the leading product being Old Deerfield Bond—a type designed for business letter heads, and probably the largest selling bond paper in the country, in its price range. It is produced in complete stocks of white, as well as in ten colors, and is marketed in several foreign countries. The company also produces at the Millers Falls plant several other popular mill brand rag bond and ledger papers, including Sales Record Ledger, Journal Linen Ledger and Milford Bond.

Throughout its life the management of the concern has believed that standardized manufacturing methods, consistent advertising and complete coöperation with selling agents permit Massachusetts-made paper to continue to compete successfully with the product of the mills in any section of the United States.

Edward P. Bagg is president, J. Edwin Randall secretary and John L. Bagg treasurer of the corporation, which has capital of $1,050,000, and employs 600 operatives.

THE ART STONE COMPANY

Another of the almost innumerable instances of the versatility of Massachusetts Industrialists is observed in the story of The Art Stone Company, which was incorporated in 1906 to manufacture dry process

cement blocks. Within two years the business was found to be unprofitable because anybody could purchase a machine, mix a little sand and cement together, pour the contents into steel moulds, and engage in the manufacture of this material locally, thereby saving all transportation costs.

Did the promoters of the concern scrap the plant, and retire sadder and wiser men? No! On the contrary they enlarged the original building, and readjusted the layout to the manfacture of pre-cast building stone, so fabricated as to imitate any natural stone that is quarried, and with a good many colors and textures unknown even to nature. This was an entirely new product and at that period was practically unknown to engineers, architects, and builders, and was formed by crushing natural stone, granite, or marble, to which coloring matter was added to match any particular shade required by a customer. Mixed to almost a liquid state, transported by conveyors to sand moulds into which it was poured, the company found an unlimited market for the commodity in the building, garden furniture,. monument, lamp post, fence post and sewer pipe fields.

In the intervening twenty years the Millers Falls plant of the concern has grown from a small shed, forty feet square, to a factory which covers approximately three acres, and from a concern employing two or three men to one that now requires the services of seventy-five operatives the present capacity being 100,000 cubic feet of stone a year.

The stone is waterproofed integrally when mixed and again with transparent waterproofing on the exterior before it is shipped to prevent it from being soiled during transit and in installation at the building, and for this reason is more easily cleaned when the structure is finished.

The concern ranks as one of the pioneers in the industry and among the best for quality and service. The industry, which was founded in this and New York state, is now a nation-wide institution.

The field of distribution enjoyed by The Art Stone Company, extends as far west as Ohio, south to the Carolinas and north to the St. Lawrence.

Irving L. Bartlett is president and treasurer, Irving L. Bartlett, Jr., vice president, and R. G. Bartlett, superintendent. The concern employs fifty operatives.

Palm hats, boots, and the tanning of leather constituted the early industries of the town of New Salem, a township which today is devoted exclusively to agriculture.

THE CHASE TURBINE COMPANY

The Chase Turbine Company, of Orange, was incorporated in 1847 to manufacture the Chase turbine water wheels, which have gained a nation-wide reputation during the intervening eighty odd years. The company is the oldest enterprise in Orange.

The plant is favorably and centrally located on original water rights on the Millers River, acquired before the end of the first half of the nineteenth century. Although still retaining the original corporate name, the product now embraces a line of high-grade special woodworking and sawmill machinery, and the concern operates its own grey iron foundry. It also acts as New England distributors of the latest type of industrial internal-combustion and steam engines and employs fifty skilled mechanics.

Albert M. Dexter is president, and G. C. Dexter, secretary, and the corporation has capital of $37,000.

THE NEW HOME SEWING MACHINE COMPANY

The influence of a large manufacturing concern on the growth and prosperity of a small town is well illustrated by the development of the New Home Sewing Machine Company, of Orange.

In 1860, Andrew J. Clark and William P. Barker, with $15,000 capital and under the firm name of Clark & Barker, began the manufacture of sewing machines in Orange, and in 1865, when but two men were employed, Clark bought his partner's interests. Two years later he had forty men on his payroll. A little later the firm of A. F. Johnson & Co., was formed, valuable patents owned by Mr. Johnson were purchased, and the Clark business was enlarged. In 1869 the firm was reorganized under the name of the Gold Medal Sewing Machine Company, and as a corporation, Andrew J. Clark being president, and J. W. Wheeler, treasurer and secretary.

The next year the company began the manufacture of the "Home" Sewing Machine, and in 1877, when all patents on these commodities expired, the business became open to all, and the "New Home" type was introduced, with many improvements upon the former product. In 1882 the New Home Sewing Machine Company succeeded the "Gold Medal" corporation.

In 1870 the town of Orange had a population of 2,091 and in 1890—twenty years later—there were 4,568 persons residing in the municipality, the increase being mainly due to the phenomenal growth of the sewing machine unit, which, in the latter year was occupying floor area of 450,000 square feet, utilizing seven turbine water wheels, which produced 300 horse power, a Corliss engine of 250 horse-power, equipped with four boilers, and another engine of 100 horse-power, with two boilers, while two 100-horse-power boilers supplied steam heat to the plant. At that period the total investment of the company stood at $2,500,000, machinery alone costing $1,000,000 and upwards of 100,000 sewing machines were being turned out annually by more than 600 employees.

Within recent years the plant has been completely modernized and some fourteen acres of manufacturing floor space are embraced within the buildings. In 1925 it was turning out 185,000 sewing machines a year. During the World War the company received $1,250,00 worth of contracts to produce shells and other supplies, and ran two shifts of 600 men.

The New Home Sewing Machine Company was absorbed by the Consolidated Industries, of Rockford, Ill., in August 1928, but the operation of the local plant, the leading industry of the town, has continued without change.

The present officers of the New Home concern are O. E. Landstrom, president, A. E. Johnson, vice president and treasurer, D. J. Fitzgerald, assistant treasurer and general sales director, and F. L. Hendricks, sales manager.

THE RODNEY HUNT MACHINE COMPANY

The Rodney Hunt Machine Company was founded in 1840, and incorporated in 1873, and has operated continuously in Orange for nearly ninety years. Following a destructive fire in the early eighties, the present plant was built, and has recently had two important additions made by the erection of an office building, and a pattern storage structure, three stories high, 98 by 54 feet, both being built in 1928.

The original product was water wheels, but the line has been extended to sluice gates, gate hoists, floor stands, fulling mills, washers, and machines for wet finishing of various fabrics, and wood, metal and rubber rolls.

The facilities include a foundry, machine and wood shops, a roll plant, a testing flume and a laboratory. As a natural flow of water is available, the testing flume is located at an actual power site.

The company pioneered in the development of textile wet finishing machinery and patents covering many of its improvements have been granted to it.

The textile machines, whether for boiling-off, dyeing, bleaching, developing, rinsing, soaping, tinting, scouring, washing, fulling or carbonizing are built in a wide variety of sizes and types, and with varying equipment, to handle any fabric, from the sheerest of silk and rayon crepes to the heaviest over-coatings and horse blankets.

One of the newer textile machinery developments for the woolen and worsted trade is the Express Fulling Mill, which affords fast fulling, under controls as direct, simple and dependable as the air-brakes of the famous express trains of the country.

The company recently introduced the continuous "Slack-Loop" system of bleaching and an oxidizer, which provides for continuous bleaching without hand plaiting.

In its roll department patented machines are produced, which are well and favorably known to the paper and textile trades, the company being the only American firm which manufactures wood, metal and rubber rolls of all kinds.

It is a safe investment to wager a large, red apple that no critic of industrial Massachusetts can successfully point to decadence in the matter of the development by this concern of a new line of turbines, which, when recently tested out in the official testing flume at Holyoke, established a new high level for turbines in this class, i. e., 93.38 per cent efficiency—a figure which, according to the best information obtainable, has never been equalled at that testing flume.

The result of this test was sufficient to influence the United Electric Light Co., of Springfield, to award to the Rodney Hunt Machine Company a contract for two large units, one to develop 3,000 horse power, and the other 2,000 horse power, under thirty-four inch head, on the Chicopee River, at Indian Orchard, which was the largest turbine water wheel order placed in New England in 1927.

It is believed the award of this class of business to a Massachusetts manufacturer marks the beginning of a new era in the production of water turbines.

Some twenty years ago, when the finest class of water wheel construction was demanded for water power development in this section, the companies usually purchased their equipment from local manufacturers, but gradually the high-grade water wheel business drifted to western firms.

The placing of so substantial an order by an outstanding power unit such as the Springfield company undoubtedly marks the beginning of the return of much of this better class of water wheel construction to local manufacturers. The engineers of the United Electric Light Company saw, in the Orange product, turbines of higher efficiency and superior features of designs to wheels offered by others.

The Rodney Hunt Company also was awarded the contract for furnish-

ing the special wood forms for the concrete spiral cases which guide the water to the new Chicopee River turbines.

N. E. Harris is president, C. C. Harris treasurer and general manager, and H. M. Johnson secretary of the concern, which has capital of $75,000, and employs 150 operatives.

Jay Bird Reynolds began the manufacture of shoes, in Brockton, in 1874, but thirteen years later removed to Orange, where he erected a large plant. In 1897 the concern was incorporated as the Jay B. Reynolds Shoe Company, with Mr. Reynolds as president and treasurer. He retired from active business, in 1902.

THE LEAVITT MACHINE COMPANY

The Leavitt Machine Company was incorporated in 1890, for the purpose of carrying on a general machine business, and introduced, manufactured and marketed the Morse valve reseating machine for globe valves. This was constantly improved and developed into the Dexter valve reseating machine, which it now manufactures. The line has been broadened to include machines for reseating gate valves and machines for refacing pump valve seats, as well as the globe valve reseating machines.

The company has had a healthy growth and is today the largest manufacturer of valve reseating machines for globe, gate and pump valves in the world, and the only company making a machine for reseating gate valves.

Its sales are international and agencies are established in the principal foreign markets.

In October, 1926, it purchased the Athol Pump Company, of Athol, which was engaged in making a line of hand pumps, unions and union ferrules, and plumbers' brass ferrules.

B. P. Dexter is president and treasurer of this $250,000 corporation.

The firm of Gale Brothers, manufacturers of wooden boxes, in the village of Tully, in Orange, is the successor to the business established by Conrad H. Gale, in 1891, who, when twenty-seven years of age, purchased the Holden sawmill and began the production of boxes, which he carried on until his death, in 1921. His sons, Conrad D., and Henry A., have made material additions to the plant and have installed new machinery in recent years.

THE SPRAGUE INDUSTRIES

In 1892, Frederick H. Sprague, originator of "The Sprague Lines," began the manufacture of trousers, in Orange, with George E. Whitney, of South Royalston, under the name of Fred'k H. Sprague & Co. In 1899 the firm became Mann & Sprague, and five years later when Frank L. Grout entered the partnership the old name was revived. In 1916, the Fred'k H. Sprague Company removed to Fitchburg, where boys' clothing only is manufactured, and the following year Mr. Sprague became manager of the Fitchburg Garment Company, which produces gingham dresses for girls. In 1919, the Orange factory was reorganized under the name of Sprague, Grout & Lowe, Inc., and men's and boys' trousers, boys' jackets, and ski coats are made there.

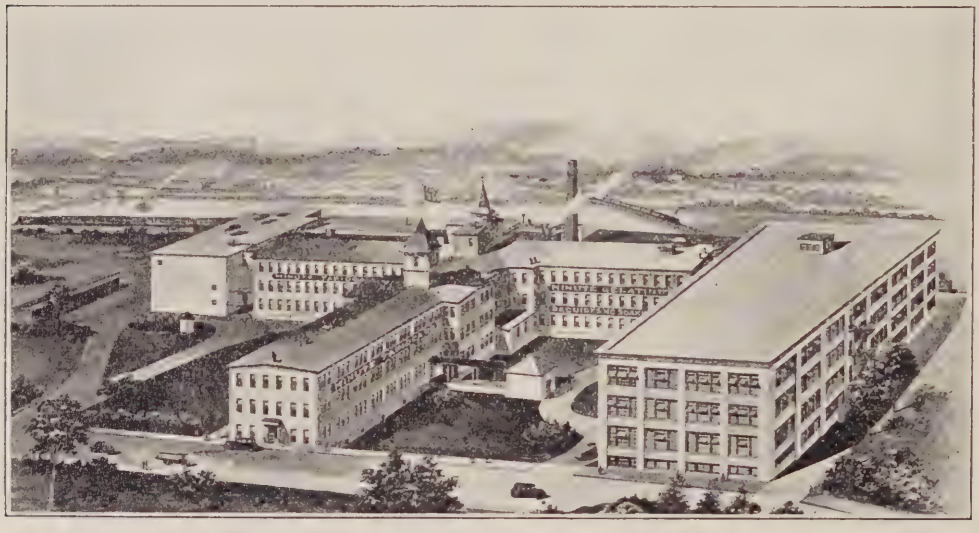
In the three concerns upwards of 300 men and women are employed.

R. B. Lowe is president, Frederick H. Sprague, vice president and general manager, and Warner M. Allen, treasurer and secretary, of Sprague, Grout & Lowe, Inc., which has capital of $100,000. D. C. Thompson is resident manager.

THE MINUTE TAPIOCA COMPANY

A sailor, a landlady, and a tapioca pudding, were responsible for an Orange concern which, in a third of a century has become one of the most widely known purveyors of a food product that enjoys an international reputation.

Early in 1849, a convalescing servant of Uncle Sam asked his landlady for a tapioca pudding. Securing some coarse flaked raw material, then on the market, she was about to produce the delicacy when the sailor recalled that in some far-away land, where his ship had put in, he had eaten a pudding made from fine ground tapioca, and suggested that she run the coarse flakes through the coffee-grinder. Then and there what ultimately became the Minute Tapioca Company was born.



MINUTE TAPIOCA COMPANY, ORANGE

Of a practical mind, the woman secured a supply of flake tapioca, ground it up, packed it in paper bags, and marketed it in a small way, under the name of "Tapioca Superlative." J. S. Whitman a resident of Millers Falls, became interested in the product, and secured the right to manufacture it. He marketed it through house to house canvassers, until the field of distribution was widened to the point where more capital was required, and The Whitman Grocery Company was formed on September 10, 1894, and incorporated with $30,000 capital to manufacture and sell preparations of tapioca, peas and beans, and to prepare, grind and market spices of all kinds.

The following year, a rainy-day lunch counter conversation between H. K. Parkman, and Mr. Whitman, revealed the latter's dissatisfaction with the progress achieved, the net result was that F. S. Ewing became a stockholder and director, and the capital was increased to $50,000, Mr. Ewing and F. L. Grout, of Orange, securing control of a majority of the stock.

Shortly afterwards, local competition became rife, as two brothers of F. L. Grout began the manufacture of another brand of tapioca, and instituted a price-cutting war, which eventuated in the absorption by the Minute Tapioca Company of the rival concern.

In 1908, the Minute Tapioca Company succeded the Whitman Grocery Company, and five years later the capital was increased to $100,000. In 1913, the company was organized as a Massachusetts corporation. From its beginnings, it has been a consistent national advertiser, and sales have shown a gratifying increase from year to year.

From the small one-room building, in which flake tapioca was originally ground by a coffee-mill, and packed by hand, has come the present extensive plant, located on the famous Mohawk Trail, where the highest grades of tapioca flour, or cassava, imported from Java, pass through patented processes of steam cooking and drying, and where no flake is touched by the hand of a single operative, all the work being done by automatic machinery.

In 1926, the corporation was acquired by the Postum Company, Inc., and is now operated as one of the units of that enterprise. Upwards of 125 hands are employed at the Orange plant. Eben E. Gridley is president, E. P. Stone and Ralph G. Coburn, vice presidents, and John S. Prescott, treasurer and secretary.

THE ADELL MANUFACTURING COMPANY, INC.

The Adell Manufacturing Company, Inc., was formed in 1903, by Edward and John A. Adell as Adell Bros. Mfg. Company. The concern first rented a floor in a small building, located on the site of the present plant. In 1905 the building and an adjoining lot were purchased and a small addition erected.

In the beginning kitchen utensils for lifting hot pans were manufactured followed by jobbing die and press work and mechanical tools. The mechanical tool part was sold in 1912, but the business was still carried on in press work and plant additions were made that year and in 1913. In 1914 still another addition of about 2,000 square feet was built. Between 1912 and 1918 the largest part of the business was for automobile universal joint casings and the concern changed its name to The Adell Mfg. Company. During this period the pressed steel automobile jack was developed.

Up to 1921 the factory had been so enlarged as to afford about 41,000 square feet of floor space, and an electrical line of junction boxes and fittings, as well as other special pressed steel devices were developed.

In 1926 the floor space was increased to 45,000 square feet.

The corporation has capital of $90,000 and employs fifty operatives. John A. Adell is president, William A. Davenport, treasurer, and Martin Edman, secretary.

THE UNION TOOL COMPANY

The Union Caliper Company was established in Fitchburg, in 1908, to manufacture calipers and dividers, and as the business grew, it was removed to Orange, where about four times more floor space was occupied, than it had in Fitchburg, and the name was changed to Union Tool Company.

In 1911, the concern purchased the tool holder business of the Hill Standard Tool Company of Indiana, which necessitated larger quarters and another building was added to the factory, and thickness gauges, thread gauges, tapes, etc., were added to the list of products.

In 1913, the company purchased the Bates Manufacturing Company, of Fitchburg, and at that time began producing graduated tools, another building being added to take care of the new line.

Its quality product tools are furnished regularly to the United States

Government and meet the most exacting specifications. The business of the company has shown a steady increase each year and before many years it will take rank as one of the largest manufacturers of tools in this country.

The concern has capital of $400,000 and employs 100 operatives. H. A. Ellis is president and treasurer, and P. E. Pederson is secretary.

BOGERT & HOPPER, INC.

In 1916, Matthew J. Bogert, who from 1874 to 1892 operated in his own name a wood-turning and square locked-corner business, which was conducted at Bellows Falls from 1905 to 1916, removed his operations to Orange. In 1892 he admitted as a partner Abram J. Hopper, and the firm name of Bogert & Hopper was adopted. Later, Messrs. Virgil and Clarence Bogert entered the firm, and in 1920 the business was incorporated as Bogert & Hopper, Inc. Approximately ninety hands are employed and between 4,000,000 and 5,000,000 feet of pine, basswood and spruce timber are cut annually.

Under the name of Strong Wood Turning Corporation, the concern operates a turning mill, at Strong, Me., and it has various other connections that are operated under the corporate name, principally in the New England states, wood turning and box manufacture being carried on at these units.

M. J. Bogert is president, A. J. Hopper, vice president, Virgil Bogert, secretary, and Clarence Bogert, treasurer. A New York office is maintained at 225 Varick Street.

In 1928 the Gridley-Downey Company, Inc., was formed, with capital of $50,000, and the brick plant originally built for the manufacture of the Grout automobile—the first structure erected in the United States for the exclusive production of automobiles—and later acquired by the Minute Tapioca Company, was purchased and machinery installed to carry on the industrial and commercial printing required by local and vicinity concerns. The new corporation was largely financed by Orange men who have long been identified with local industrial units. It has capital of $100,000 and employs thirty-five hands. L. S. Downey is president, E. P. Stone, vice president and E. E. Gridley, treasurer.

The MacRobert Shoe Company, originally known as the Orange Shoe Company, occupies a portion of the Gridley-Downey building, in the manufacturing of infants', children's and misses' stitched-down shoes, and employs thirty-five operatives. John H. MacRobert is president and Frank A. Howe is secretary and treasurer.

F. C. Worrack is engaged in the manufacture of tables, under the name of F. C. Worrack & Co.

THE FAMOUS DAVIS MINE IN ROWE

For upwards of a third of a century there was operated in Franklin County the richest pyrites mine in the United States and from 1882 until well along in the first quarter of this century its products accrued to the financial advantages of Herbert J. Davis, a New York commission merchant.

Just how it came to be unearthed and its rich deposits extracted from their beds constitutes one of those romantic chapters such as one might expect to come from the West, but which is an unusual tale on the Atlantic seaboard.

On a business trip to Sherbrooke, P. Q., Mr. Davis became financially

interested in the Albert pyrites mine, and without any particular purpose in mind took home with him to his New York office several fine specimens of the ore.

In the late summer of 1880, a gentleman from Pittsburgh stopped in New York, on a return journey from Boston, and dropping into Mr. Davis' office, displayed what proved to be a very fine specimen of sulphur pyrites ore. Mr. Davis interrogated his visitor regarding the same and was informed that a friend of his, a professor of the Massachusetts Institute of Technology, took his class in mineralogy prospecting through the mountainous country of northwestern Massachusetts, and one day, coming to a spot in Franklin County, where a man by the name of Brown operated a small farm, he knocked off a fragment of what appeared to be an ordinary boulder with his prospecting pick, only to discover that the rock formation jutting out of the surface was heavily mineralized.

The piece that he had presented to Mr. Davis was broken off of the first fragment. Ascertaining the location of the property, and leaving New York the following day Mr. Davis went to the point described on the Brown farm. He found the country in a very wild, primitive state, and the people so poor that, to use his own words, they were "sitting on the fences swapping jackknives for a living." Finding after much inquiry the spot where the professor made the first strike, and receiving permission from Mr. Brown, the owner, to dig on his property, Mr. Davis hired several nearby farmers, paying the then unheard of stipend of five dollars a day to dig for him. When Mr. Davis had excavated to a depth of approximately thirty feet, he decided to purchase the property, as the vein, starting at grass roots six feet in diameter, continued to widen.

In the early eighties pyrites instead of brimstone was beginning to be generally used in the manufacture of sulphuric acid, and Mr. Davis was quick to take advantage of the situation. He subsequently secured options in 1882 on three farms, which gave him about a mile and a half of terrain in the strike vein. Three months later he arranged with local contractors and a dozen miners to open the deposits, and for thirty years thereafter the mine was operated, with night and day shifts. There speedily grew up a flourishing village, called Davis, with its own school, post office, hotel and company store.

With the aid of Boston capitalists, the mine was developed until it became the premier sulphur property of America, with a vein of rich bonanza ore forty feet in diameter, the product, as all the records show, enjoying a distinct preference in the chemical industry owing to its freedom from arsenic.

George Hanford, still living in Rowe, mined the first load of ore and Jimmie Willard, who now disturbs the nocturnal naps of the villagers in Charlemont, as he makes the rounds delivering the local milk supply, is pointed out to visitors as the teamster who hauled the largest load of ore from the mine to the railroad station. Tradition has it that with a pair of horses he drew thirteen tons to the freight depot in one load.

Between the mouth of the mine and the railroad irons there is a drop in altitude of almost 600 feet, and it was down a long, steep and winding mountain road that all the ore extracted was hauled by horses. In the summer season heavy wagons were employed, while in winter the ore was transported on sleds. The huge storage shed at the freight depot still stands, now occupied by a woodenware manufacturing concern, but a mute reminder of the busy scenes of almost a score of years ago. But two trips a day could be made, the average load weighing from four to five tons.

Constant friction existed between the teamsters and the taxpayers of Charlemont, due to the fact that the mine was located in Rowe, and paid no taxes in Charlemont. The ore wagons, with their heavy loads, kept the highways of the latter town in a chronic state of impassability. An average of 100 tons of ore a day passed over the village streets, and being unable to turn out in the wet seasons for fear of becoming mired, the natives who had occasion to drive on the roads traversed by the heavy wagons often spent two hours in traveling five miles. Finally the differences became so great that the citizens of Charlemont rushed to the Massachusetts Legislature for relief and secured the passage of a bill requiring ore wagons to be equipped with broader rimmed wheels, but even this palliative did not serve to alleviate the trouble. Siftings from the wagons fell from the loads and after a period of years the amount of ore deposited in the highway soil was such that washings from it after rains killed all the shade trees between Wells Corner and a covered bridge on what is now the Mohawk Trail.

When the mine was first opened Mr. Davis imported miners from Cornwall, and for many years the village was a replica of a typical Cornish mining town. The men from Cornwall brought with them their methods of mining and to them was due much of the early success of the enterprise. Later, miners were brought from Austria and Italy, but they were not as efficient as their predecessors in their methods of workmanship, and soon the pillars left by the Cornish men began to weaken and levels commenced to cave in, until at the last the mining operations became little more than a robbing process, the workers taking out only the ore they could easily reach, and making no plans for the future.

Before work entirely ceased under the Davis management, the main shaft had been sunk 1,400 feet, and as the mouth of the mine is only 1,300 feet above sea level, the last work carried on by the local miners was accomplished 100 feet below the level of the ocean and probably 800 feet below the bed of the Deerfield River.

The method employed at Davis was unique, because the deposit of pyrites was found in an unusual formation. The miners dug down for a distance of about sixty feet, and then drifted out from the shaft, in every direction, thus producing levels, of which some twenty-four were developed. The walls of the shaft and the ceilings of the various levels, were propped up with heavy maple logs, twenty feet long and two or three feet in diameter until today there rest in the abandoned mine millions of feet of heavy timber used for this purpose.

Three shafts were opened, but never more than two were used simultaneously. Ore was not found in a steady vein, but went and came, with here and there nests of high grade copper, which tested 13 per cent pure and which frequently permitted mining of from two to three carloads.

The pyrites was used chiefly for the sulphur it contained, and was mined in lumps about the size of anthracite coal. The water encountered constituted a real problem, and even a ten-inch Cornish pump, operating twenty-four hours a day, with several auxiliary donkey pumps, could scarcely keep the mine pumped out in rainy seasons. The water contained a strong acid which would eat out an iron pipe over night, and only brass and other rust proof materials could be employed. The waste, pumped into the Old Mill Brook killed all the fish and some claim that it was reponsible for the extermination of fish in the Deerfield River for miles east of Charlemont.

Thirty-one lives were lost in mine accidents during the thirty-two years

that Mr. Davis operated the plant, but major catastrophes were avoided. One miraculous escape occurred on a Sunday night, about a year before the shafts were closed. No workmen were employed from Saturday night to Monday morning, and when the fourteenth level collapsed on this particular Sabbath evening, in 1911, the mine was idle.

In the heyday of its activity, the Davis mine was responsible for an annual local payroll of about $100,000, and much of this was spent by the miners and their families in the vicinity of Rowe and Charlemont, whose merchants and farmers profited thereby.

For many years Mr. Davis shipped from the railroad station, at Charlemont, between 3,000 and 4,000 tons of pyrites monthly. An analysis made by the United States Geological Survey revealed the fact that the ore extracted contained 48 per cent sulphur, 44 per cent iron, 1.6 per cent copper, 1.5 per cent zinc, lead, etc., and 3.7 per cent silica.

When Mr. Davis died in 1908, a relative took over the operation of the mine, and continued activities until late in 1911, when marketing difficulties appeared to render further work unprofitable. The mine remained idle until 1923, when Dr. G. M. Gray, of Greenfield became interested in it. Despite many discouragements his ambition to see it again in operation never flagged, and during the summer of 1928 he succeeded in attracting sufficient capital to warrant the expenditure of $30,000 in ascertaining the value of the remaining ore deposits.

Operations were carried on until the end of December, 1928, by a gang of men who, owing to the fine weather conditions, found it possible to continue the work longer than was anticipated earlier that year. A New York company was engaged to locate the sulphur ore veins by the use of the radio—this new method of discovering minerals being used here for the first time, although it has been employed in the West within recent months with success. The electrical apparatus, together with skilled operators, remained on the property during the fall and early winter months during which period the much searched for lode was discovered.

By the new method surface mining is to be undertaken, which it is believed will facilitate production, particularly as it is thought there exists a vast field of ore in the vicinity. The revival of interest in these sulphur deposits is said to be due in no small part to the fact that the most available supply hitherto obtained from Texas is rapidly diminishing.

The lease on the mine, including an option for purchase, is now held by one of the largest paper-producing corporations in the country, with headquarters in Maine.

THE MAYHEW STEEL PRODUCTS COMPANY

Pocket knives and musical instruments were manufactured and a tannery, and silk twist factories flourished at Shelburne Falls, in the town of Shelburne, many years ago.

The plant now owned and occupied by the Mayhew Steel Products Company, originally was occupied by the Yale Mfg. Company, which later became the Yale & Towne Mfg. Co., of Stamford, Conn. Because of the failure of the original Yale concern to secure satisfactory water power at the Shelburne Falls location the unit removed from Massachusetts to the Nutmeg State, to the great disadvantage of the former Commonwealth, as it ultimately became one of the leading industries of Connecticut. About 1866, H. S. Shepardson organized H. S. Shepardson & Co., and inaugurated the manufacture of braces, bits and small tools—a line that has been continuously produced in the plant up to the present. In 1895 H. H.

Mayhew bought the business and operated it under his name until 1918, when, upon reorganization, it was incorporated as the Mayhew Steel Products Company.

Three-quarters of a century of experience and constant improvements in tools and machinery enables the concern to carry forward the high standards of quality and value set by the founders. Today, all the machines, furnaces, hammers and drops are electrically operated and Mayhew tools are known throughout this country and in foreign lands as of a superior type.

The concern has capital of $500,000, employs upwards of 200 operatives, all of whom are native citizens, and many have grown up with the business, devoting their lives to its interests. J. W. Thurber is president, J. B. Parsons, vice president, and H. B. Upton, treasurer.

In 1929, H. P. Davenport, who for many years had been engaged in the production of lumber, in Shelburne, built an extensive addition to his local plant, and installed machinery for the manufacture of handles of ash for tennis racquets.

In 1854, Nahum Jones began the manufacture of boots in Warwick, producing about 20,000 pairs a year, valued at $50,000.

CHAPTER XXVI

SPRINGFIELD

THE INDUSTRIAL BEEHIVE OF MASSACHUSETTS AND THE HABITAT OF ALMOST FOUR HUNDRED MANUFACTURING ENTERPRISES

No more convincing evidence of the ingenuity, vision and courage of Massachusetts capitalists, inventors and manufacturers is gleaned from a state-wide survey of the influences that surround the birth of industry in this Commonwealth than is obtained from an analysis of the industrial prowess of the city of Springfield.

Few manufacturing centers in the state were less favored with natural facilities for the promotion of industry than existed in the town in its early days.

The waters of the Connecticut have not and cannot be readily diverted to manufacturing purposes within the present city limits, while the only other stream of sufficient size to afford water power is Mill River, a narrow course of limited capacity. Yet from the beginnings of the old town of Springfield this water-artery has been utilized to the full, and countless were the saw, grist, fulling, cloth, tanning, and bleaching plants that dotted its banks in the earlier years.

SPRINGFIELD MANUFACTURED SAIL DUCK IN THE LAST DECADE OF THE 18TH CENTURY

In the June 27, 1792, edition of the *New York Journal* there appeared this item:

"A manufacturer at Springfield, Mass., has discovered a method of spinning hemp, hitherto unknown in this country. His sail-duck is now entirely manufactured from that article (instead of flax, as heretofore). It is said to have every advantage over sail-cloth made from flax, being whiter, more durable, and not subject to mildew."

In 1795-97 when the Duke de la Rochefoucauld Liancourt, a French nobleman, was visiting this country, he wrote in his "Travels through the United States of North America": "I learned that, in those parts of Connecticut which lie along the River and contiguous to Massachusetts, there is a considerable quantity of hemp produced, that supplies materials for a manufacture of sail-cloth in Springfield, in which twenty men are constantly employed, and which, during the seven years which have elapsed since its establishment, has afforded large profits to its owner."

This entry and the newspaper article seem to afford the only authentic data covering the operations of this early textile enterprise, which antedated the coming of the Government armory.

THE FIRST UNITED STATES ARMORY

Industrially Springfield did not exist before the Revolution, save for a few blacksmith shops. It was essentially a trading center up to that

time, as it had been from the day William Pynchon established the colony there and began to barter with the Indians.

As the first town settled in western Massachusetts, Springfield found its growth long retarded by Indian hostility, but on the other hand its central and inland, yet accessible, situation proved an asset as a safe and convenient place, for a recruiting station, a depot for military stores and for the repair and manufacture of munitions of war during the Revolution, and commended it to the authorities.

Soon its main street was occupied by the shops of artisans employed in the public service and in April, 1794, the Federal government established its first armory, in Springfield.

Eli Whitney, the inventor of the cotton gin, was engaged in the production of rifles at the local armory during the earlier years of its existence, and while there perfected machinery for their manufacture, according to the principle of the standard interchangeable part.

The making of small arms began at the armory in 1795, the forty men employed producing 245 muskets the first year. In the intervening years, upwards of twenty-five different models of army rifles have been manufactured there. The first American-made flint-lock gun was locally produced in 1822, and improved in 1840. Two years later the flint-lock system was virtually abandoned and the percussion lock was introduced, this type being first employed in the War with Mexico, in 1846-47. At the outbreak of the Civil War, the working force was greatly augmented, and by 1864 one thousand guns were being turned out daily, some 3,400 men being employed at that time.

In 1861 a month was required to produce 1,000 guns. During the period of the war the output rose in 1861 to 14,000 guns; in 1862, to 102,000 guns; in 1863, to 217,000 guns; in 1864, to 277,000 guns; and in 1865, 196,000 guns were produced.

In 1873, 1898 and 1903 new models were introduced, and in 1904 the armory was turning out 300 guns daily, 1,400 men being then employed. The Springfield armory has storage capacity of 300,000 rifles, and the grounds embrace seventy-four acres. The present capacity of the armory is 24,000 guns per week, besides extensive repair work.

THE INFLUENCE OF THE ARMORY UPON LOCAL INDUSTRY

When the United States armory was established it determined Springfield's character as a manufacturing community. From that time to this it has been the magnet to draw to the Hampden County city the skilled mechanics for which it has been famous from the beginning.

Once there, they remained, and became available to the other industries that grew up, from time to time, on the banks of the Connecticut.

It is perfectly obvious that the history of Springfield might have been a far different story; that the city might well have remained a commercial, rather than an industrial center, had George Washington selected Mittineague as the site of the Federal Armory a century and a half ago, or had he located it on the western, rather than on the eastern shore of the Connecticut River, where now lies the town of West Springfield. Even if the government had placed the armory elsewhere, Springfield might have become an ordinary sized community if the fathers of the town of Suffield had not, in their shortsightedness, blocked the building of the Southern railroad, on the west shore of the Connecticut River. In such an event West Springfield undoubtedly would have been the metropolis of the western part of the state. Thus we see how important what at the moment

appears to be a relatively small matter may become in the ultimate growth and progress of a community.

AMES' CYLINDER PAPER-MAKING MACHINE REVOLUTIONIZED THE TRADE

The development of paper manufacture in Massachusetts constitutes one of the romantic chapters of our industries. In 1802, David Ames, then superintendent of the Federal Armory, at Springfield, resigned that position and bought an idle mill on the bank of the Connecticut, just east of the present plant of the Springfield Webbing Co., where paper had been produced prior to the Revolution, but finding the facilities inadequate, he tore down the structure, and erected a new mill, which stood for seventy-five years.

His son, John, who inherited his father's inventive genius, produced and operated, in 1822, a cylinder paper-making machine, which completely revolutionized the process, and by which a wheel, covered with wire web, revolved, half immersed in the pulp vat. The pulp, deposited on the web, was taken off in a continuous sheet. Prior to that time paper stock, after having been converted into pulp, was taken from the vats in a hand mould, akin to a sieve. The water was drained from the rough sheets, and the stock placed between layers of felt in a large press and subjected to heavy pressure, before being sized by dipping. A patent was granted Ames on his new machine, on May 14, 1822, and the new method developed by leaps and bounds. So successful did Ames and his brothers become that they resolved to keep the method a trade secret, and thereafter their employees were required to take an oath on a Bible, kept solely for that purpose, that they would not divulge what they observed going on in the plant. But some unscrupulous citizens broke into the mill after nightfall, appropriated the method, formed a combination and in a legal battle which followed Ames and his brothers lost the exclusive right to the process.

In 1830, Messrs. Ames & Company employed sixteen engines, used three tons of rags every twenty-four hours, and made eighty reams of the largest sized printing paper and 180 reams of foolscap or letter paper, daily. It was claimed as the result of the Ames invention that paper came out of the machine in an endless sheet, enabling one man to do the work of thirty under the previous method, and that the Ames process was superior to that flowing from the Fourdrinier machine, as it existed at that period.

HARNESSING THE CHICOPEE RIVER

Prior to 1848 the most sought locality for manufacturing was along the banks of the Chicopee River, where a few small factories were planted 125 years ago.

A little more than a century ago the waters of the stream were diverted for industrial service, and at least two large corporations were formed, for the purpose of building dams and canals, and mills were built which later became identified with Chicopee, when that municipality was set off from Springfield, in 1848.

In 1818 straw carpetings, said to have been produced locally, were advertised for sale, in Springfield.

In 1823 the Boston & Springfield Manufacturing Company was incorporated, and began the erection, on the Chicopee River, in the territory then embraced in Springfield, of a plant designed for the production of cotton goods and iron—an odd sort of combination as viewed today. It

was capitalized for $500,000 and began operations, in 1826. The next year the corporate name was changed to the Chicopee Manufacturing Company, and woolen goods and machinery were added to the products. This unit was the progenitor of the present Chicopee Manufacturing Corporation of Chicopee.

In 1826 the Springfield Card Manufacturing Company was incorporated to manufacture machines and cards, the plant having entirely disappeared in the intervening century.

THE SMITH CARRIAGE COMPANY

In 1827, when the town of Springfield could scarcely boast of 6,000 inhabitants, a farmer's boy from Feeding Hills set up a modest two-story brick carriage shop on Park Street, which evolved into the Smith Carriage Company, the oldest established plant in the city today.

An expert wheelwright, though but twenty-four years of age, when he embarked on his business career, David Smith quickly gained a reputation which enabled him to outdistance all his competitors in producing coaches, phaetons, cabriolets, buggies, sleighs and farm wagons, which soon were observed on all the highways of western Massachusetts, bearing the Smith hall-mark. Not only were many of the famous stage-coaches turned out at this pioneer factory, but it can claim to be the cradle of the American automobile industry, for it was William H. Smith, a son of the founder, who, in 1892, built the body for Charles E. Duryea's original automobile—the first gasoline power car ever operated in the United States.

Since these pioneering days many thousands of automobile bodies have been turned out in the Smith factory, which still occupies its original Park Street site, until the company's business has become exclusively the manufacture of commercial-type bodies of automobiles.

David Smith's original account book, now in the possession of his heirs, shows that money was not as plentiful in 1827 as today, and frequently he accepted a barrel of cider in part payment of a farm wagon, or allowed his patrons to "work out" the cost of a vehicle by assisting in the labor at the factory.

He attributed much of his success as a carriage builder to his judicious use of printer's ink. As early as 1830, his well-written advertisements appeared regularly in the *Springfield Republican.* One of these announcements, bearing the date of June 26, 1830, informed his friends and the public generally that he "has on hand and is finishing several one-horse wagons of various descriptions, some with capbands (a new article equal to castiron hubs, for neatness, etc., and at much less expense). Also on hand a good second-hand chaise, very cheap, for cash or credit. Also several barouches, with cradle and elliptic steel springs." The advertisement also called attention to the fact that repairing, painting and blacksmithing of all kinds were carried on at his factory, and that "as all of these various branches come in his line of business, they will be done much cheaper than is usually done."

David Smith's fame extended and in a few years following his 1827 venture he added another factory unit on the opposite side of Park Street, and later remodeled a vacant Methodist church into a part of his plant. For forty-six years he was actively connected with the concern he formed, but at the age of seventy-one he retired and was succeeded by his son, William H. In 1903 the firm name of D. Smith & Co. was changed to Smith & Hubbell, and in 1915 a new corporation was formed and the

concern is now known as the Smith Carriage Company, of which N. N. Fowler is president, R. V. Johnston, secretary and W. S. Fowler, treasurer.

HORSE POWER VERSUS STEAM POWER

On January 28, 1829, just a trifle over one hundred years ago, the *Springfield Republican* devoted considerable space to the report of the state "board of directors of public improvements," covering projected railroads from Boston to Albany, and from the Hub to Providence. The route recommended for the former road passed through Springfield, but crossed the Connecticut River a mile north of the old toll bridge, and at a location near where the so-called Northern Bridge stands today. It then crossed the Agawam River, whose bank it followed to the westerly part of what was then the town of Westfield, and threaded its way up the valley to Pittsfield, via the southern branch of the Westfield River.

The most amusing and interesting part of the report, however, was the recommendation that the railroad be operated by horse power, the state board apparently regarding the proposed artery of transportation as scarcely greater than that of a glorified stage coach on wheels. It was suggested that water power might be employed as an aid to the horses on the steeper grades.

According to the report, "horse power, at the low rate of horse keeping in this country, is cheaper than steam power for locomotives in England, even at the low cost of coal near the coal mines in that country."

It appears that the directors had not become aware that some time before the date of their report, Thomas Blanchard had operated on the streets of Springfield his famous, although primitive, steam carriage—the precursor of the steam automobile of almost seventy-five years later.

But it must be recalled that the pioneer American railroad—the Granite Railway, of Quincy—had been in operation only about sixteen months before this report was rendered and on that enterprise horse power and gravity were originally employed.

The first public railroad, equipped with a steam engine, had been inaugurated between Stockton and Darlington, in England, in 1825, when George Stephenson's locomotive had its initial tests.

"The cost of transportation on a railroad in this country by horse power," said the report, "will be less than in England by either horse power or steam power. The cost of oats and other food for horses in England in general is nearly double its cost in this country. The lowest rate of tonnage on the Darlington railway is but a trifle higher than our estimate of the cost of transportation per mile, exclusive of the toll, on a railroad from Boston to Albany. Yet the profits of this transportation pay a higher dividend on the cost of the road, which exceeded 10,000 pounds sterling a mile."

The report estimated the cost of the road from Boston to Albany at $16,435 a mile. It reckoned on a horse speed of three miles an hour, ten stages of twenty miles each with twenty horses employed on each stage, with extra horses for the grades, and a four-day journey from Boston to Albany. It was estimated that freight could be carried for $1.97 a ton, compared with $3 or $4 for freightage by sloop.

G. & C. MERRIAM CO.—A CENTURY OLD CONCERN

For almost one hundred years Springfield has been the home of the famous group of Webster's dictionaries—the standard reference publica-

tion in almost all of the schools and colleges of the country, in ninety-five per cent of all the newspaper offices, and in all government offices.

The publishers of this work, the G. & C. Merriam Company, began business in Springfield, in 1831, and since that time have established a reputation as the leaders in their field.

The concern had its origin when George and Charles Merriam came to the town of Springfield, at the suggestion of Dr. Samuel Osgood to open a printing office and bookstore. A year later, the partnership of G. and C. Merriam was formed.

George, the older of the partners, was born in Worcester, on January 20, 1803. His father, Daniel, was in the printing business with a brother, Ebenezer, but left the actual management of it to his partner, while he operated a farm in West Brookfield. George received his education in the district school and worked on the farm of his father until he was fifteen years of age, when he entered a country store as clerk. Dissatisfied with this occupation and acting upon his father's suggestion, he became an apprentice to his uncle in the printing office. In 1823 his father died and George acquired his father's interest in the business and became a partner.

In the meantime, Charles, the second son of the family, had completed his education at Monson Academy and had taught school in Hadley. He returned to his first love, printing, and worked first in Philadelphia, then in Boston and finally, in 1820, returned to West Brookfield, to assist his uncle and brother. When their father died in 1823, the two boys gave their slender earnings to their mother and sister, toiling early and late to push their way forward.

In 1831 the time appeared ripe for them to come to Springfield, and they began business as retail booksellers and printers, publishing in a modest way an admirable series of school readers, the "Child's Guide," "Village Reader," and several other volumes compiled by the older brother.

NOAH WEBSTER'S CONTRIBUTION

In 1828, after twenty years' labor, Noah Webster gave to the world his first dictionary—a splendid monument to scholarship. It was in two volumes, but it contained a few eccentricities of spelling. The American public was not yet ready for such deference to English authority and the first edition of 2,500 volumes required thirteen years in the selling. In spite of the flood of criticism hurled at him, Webster stood by his guns, revised the work on its original lines, and brought out a new edition, in 1841. That, too, found little sale, and in 1843 Webster died, his life work apparently a failure.

When, at his death, the second edition came on the market, the Merriam brothers realized its potential value and bought the unsold edition and the publishing rights to his dictionary and famous speller. That purchase marked an alliance of business and scholarship which has borne fruit for over three-quarters of a century.

INTRODUCING THE ART OF SALESMANSHIP

The new publishers' first work was to fit Webster's wares to the public demands in order to make the dictionary salable. They employed Prof. Chauncey A. Goodrich, Webster's son-in-law and literary heir, to re-edit the book. The eccentric spelling was dropped and several reasonable changes made. Leading scientists of the day, including Professors

Silliman and Dana, of Yale University, were retained as full contributors, and, in 1847, the work was brought out in one volume.

Public favor was immediately won and has been retained to this day. Webster's executors, at the time of the sale of the copyright had appraised its value for the unexpired ten years at $3,000 and the Merriams bought it at that price. They had so increased its value that when the copyright was renewed for fourteen years, they made terms with the Webster family by which during that period they paid to them for the large book with its abridgements, and the speller, a quarter of a million dollars.

Up to this time, the firm had been publishing in addition to the dictionary, some law books and Bibles. The demand for the dictionary became so great that they leased the abridgements and the speller and other publications to other houses and concentrated their whole energy upon the large book.

In 1850 it was proposed in the Massachusetts Legislature, but not at the suggestion of the publishers, that a copy of Webster's large dictionary be placed in every district school. After much controversy, the schools were offered their choice, and 3,035 expressed a preference for the Webster dictionary. Soon after 10,000 copies of the book were placed in the schools of New York State, thus beginning its acceptance as the school standard which today extends over the entire country.

RIVALS ENTER THE FIELD

The success of this reference book attracted the attention of other publishing houses and, as a result, rival dictionaries began to appear. Realizing the necessity of meeting this competition, the Webster publishers placed in a supplement a large number of classified illustrations, a new feature in an American dictionary, added a supplement of new words which had long been accumulating, and appended a valuable table of synonyms. This new volume immediately took the public by storm and thereby strengthened the hold already obtained.

Next they set at work on a radical and thorough revision. Under the supervision of Prof. Noah Porter of Yale College and with the aid of a group of eminent scholars, the advances in linguistic science and in popular usage were inwrought with Webster's solid groundwork. The period of this revision was that of the Civil War. Business fell off, the southern market was lost, the income from the speller was intermittent and the postponement of payments to the Webster family were amicably arranged.

War taxes were heavy, but the three brothers, Homer Merriam, a younger brother, having been admitted to the firm, in 1856, pushed the revision steadily, while they supported the war and looked for the return of peace and prosperity.

THE ADVENT OF THE UNABRIDGED EDITION

Then came the birth of the great book, "The Unabridged," in 1864, its predecessor being completely superseded and withdrawn from the market.

A battle of pamphlets, turning very largely on the question of spelling, the general prevalence of the Websterian practice, an eclipse of all rivalry in the commercial field, the fresh supplement of new words in 1879, the gradual addition of biographical and geographical tables, all were incidents leading up to the next great revision, which made its appearance in 1890, as the now famous Webster's International dictionary.

To this revision, a work covering ten years and costing over a third

of a million dollars were given the fuller elaboration, a larger permanent staff, the freer employment of specialists and the most exact attention to every detail. In a work carried on thus through generations, there has developed a special art of dictionary making, progressive and always expanding to meet new conditions, and in this field the Springfield firm has led the way.

Webster's New International dictionary, known as The Merriam Webster, is the largest and latest of the Merriam-Webster series and has become almost a universal question-answerer, recognized throughout the English-speaking world as the supreme authority on all matters pertaining to words and giving accurate, encyclopedic, up-to-date information of all kinds.

In type-matter it is equivalent to a fifteen volume encyclopedia, containing 2,700 pages, 452,000 entries, including 409,000 vocabulary terms, 12,000 biographical names, 32,000 geographical subjects, 100 tables, and 6,000 illustrations.

A. G. Baker is president, William C. Ivison vice president, R. C. Munroe secretary and Kirk N. Washburn treasurer of the G. & C. Merriam Co., which employs seventy-five persons.

In 1832 the Springfield Manufacturing Company was incorporated, with authorized capital of $1,000,000, for the manufacture of cotton and woolen goods, and in 1848 the concern was lost to Springfield, when Chicopee was incorporated as a town.

It was on October 22, 1834, that John W. Cochran was granted a patent on rotary cylinder cannon, and on March 23, 1836, a reissue of the grant was made, in which year a factory was built, in Springfield, and eight of Cochran's many-chambered cannon were manufactured each week.

The Ames Manufacturing Company was incorporated in 1834, for the manufacture of hardware and cutlery, and two years later the Chicopee Falls Company was formed, both of these concerns becoming a part of the industrial life of Chicopee, in 1848.

Alonzo D. Phillips, of Springfield, was granted a patent on friction matches, on October 24, 1836—the first American patent on this commodity—the constituents of which were chalk, phosphorous, glue and brimstone.

It is significant that today, nearly a century later, matches are still manufactured in Springfield, where one of the units of the Diamond Match Company is operated.

THE WASON MANUFACTURING COMPANY

The firm of T. W. Wason & Company, which succeeded the Springfield Car & Engine Company in the building of cars, was made up of Thomas W. and Charles Wason, who, about 1836, began, on the bank of the Connecticut River, preparing lumber for railroad bridges, and who also carried on the business of repairing and building freight and gravel cars. In 1845 they leased a plot of ground on which they built a shop for manufacturing freight and baggage cars, buying the car wheels and most of their castings from the foundry of Sizer & Co. When, in 1848, the Springfield Car & Engine Company determined to withdraw from the business, the Messrs. Wason purchased the stock and tools in the car department, having disposed of their former business to Messrs. Stone & Harris.

Three years later T. W. Wason purchased his brother's interest and in the latter part of 1851 bought the foundry of Henry Sizer. He was

successful from the start, and soon was doing a business of $200,000 a year. In 1853 he disposed of a half interest in the car manufactory, and the firm name of T. W. Wason & Company was adopted. He remained, however, sole proprietor of the foundry. The car concern employed from 150 to 200 men, and manufactured passenger, emigrant, baggage, freight, horse and hand cars.

At that time the plant included a two-story brick factory, 270 by 70 feet, a machine shop, 80 by 70, a blacksmith shop, 180 by 44 feet, a planing mill, 70 by 44 feet, a brick dry-house, three large paint shops large enough to accommodate ten passengers, sixteen freight and six street cars simultaneously, and a foundry, 112 by 70 feet, besides numerous small structures.



WASON MANUFACTURING COMPANY, SPRINGFIELD

Cars from this establishment went to China, Brazil, Venezuela, and Canada, while at that period the greater part of the rolling stock used on the Pacific slope bore the Wason trade mark. An order for 160 passenger and freight cars for the government railway, in Egypt, was executed in the '70s.

Here the first sleeping car ever built in the United States was made, for George M. Pullman, and in the '60s the concern employed 300 men, and used 1,000 tons of cast iron, 450 tons of bar iron, 30,000 pounds of brass and composition castings, and a million feet of lumber annually. The foundry manufactured car wheels exclusively.

On April 17, 1862, the Wason Manufacturing Company was incorporated, with $50,000 capital, and the plant was removed to the Brightwood district.

It has never been asserted that Hampden County people have any

larger appetites for food than the denizens of other sections of Massachusetts, but their interest in gastronomics is bound to become proverbial.

While Massachusetts is particularly proud of her major industrial enterprises, her citizens are prone to forget that twenty-five years ago there began in Springfield the growth, not from the proverbial acorn, but from the seed of a Massachusetts apple, of a lunchroom system that has become a national institution, with more units in operation than the Childs chain, and now in competition with the historic European Lyons eating houses for the world honor of being the largest concern in the restaurant field.

The great Waldorf System, which annually purveys food to more than 50,000,000 people in the United States, with total sales of $14,000,000 is the lineal descendant of Harry S. Kelsey's first Waldorf lunchroom, which he opened in Springfield in 1904. The great genius for organizing possessed by Kelsey has resulted in the development of upwards of 125 Waldorf restaurants in forty-odd cities of the United States and in a system which is a marvel of efficiency and service.

Over forty years ago, and fully fifteen years prior to Kelsey's contribution, another Springfield man—Samuel Jones—was the proponent of the first lunch-cart of the pioneer "owl" type, and from his initial horse-drawn vehicle, driven forth at night and returned to its storage place in the small hours of the morning, operating at that time only during the period when boarding-houses and hotel restaurants failed to serve meals, grew the great nation-wide system of lunch-cart service twenty-four hours a day, and seven days a week, with the "vehicles" ultimately resting on permanent sites, and with electric lights, gas stoves, running water and all the up-to-date appurtenances demanded by the public, constituting their equipment.

And, in 1928, Springfield was again found blazing the way from the mouths to the stomachs of the populace by creating, designing, manufacturing and installing the latest creation catering to the human appetite—the steel dining cars, which are superseding the lunch-cart, and the production of which has afforded employment to many additional workers at the Springfield plant of the Wason Manufacturing Company.

The manufacture of these cars is a new departure and at the Brightwood plant was built the first all-steel frame dining car produced in America, the exterior metal surfaces being finished in lacquer while the interior ceilings are of vitro-enamel sheets. With inside trimmings of mahogany, tiled floors, capacity for thirty-six diners at a time, and perfect ventilation, the evolution from the cafeteria to a fine dining car is proceeding apace.

Production is now going to industrial establishments where their use enables food to be cooked outside factory buildings, thus reducing the fire hazard; to oil and gasoline purveyors, who are locating the diners adjacent to filling stations; to schools, resturateurs, and to the general trade.

Besides building diner cars the Wason factory is continuing its regular line of railway and electric car building, and also automobile body, motor boat and airplane work. The local plant has twenty-seven departments including structural steel work, woodwork, sheet metal work, pipe work and forging.

The concern is producing a seven-passenger mahogany outboard motor boat, at the Brightwood plant, which departure has resulted in the employment of additional men. Shipments are made to many parts of the United States.

The distinction of putting out the most luxurious boat in its class is claimed for the local establishment. The main structure is all of genuine African mahogany, and the craft is equipped with nickel silver trimmings, glass windshields of the automobile type, and electric lights for lighting and signal use. The hull is of "V" type, with streamline design and with its unusual design of cockpit the boat makes a classy appearance as it skims over the water. It is finished in natural mahogany, with green bottom and white stripe at the water line.

While primarily a sport boat, the "Wason 18" is regarded as a good utility boat as well, being well adapted to the requirements of the commuter looking for a light, dependable craft for daily use.

The boat weighs 650 pounds without engine and travels at the rate of 20 to 30 miles an hour, depending on the load and the type of motor used.

The Wason Manufacturing Company has capital of $300,000, and employs 350 operatives. Samuel M. Curwen is president, Charles F. Johnson vice president and general manager of the Springfield plant, Edward P. Rawle treasurer and Walter Abrahams, assistant treasurer and secretary.

THE ADVENT OF THE MONKEY WRENCH, AND THE COMING OF THE BEMIS & CALL CO.

A little less than a hundred years ago an ingenious Springfield builder of bridges, who bore the name of Solymon Merrick, was accused by his fellow-workers of profanely addressing a set screw that slipped on the bolt he was attempting to fasten.

Whether it was because he was chided by his associates for the use of strong language, or whether with him necessity was the mother of invention cannot be asserted, but it is undisputed, however, that he straightway resolved to evolve a mechanical tool that would work with some degree of regularity and efficiency.

The child of his brain was the monkey wrench—simple enough to be smiled at and significant enough to instantly arrest the attention of the mechanical world.

There are those who assert that Charlie Monckey, another Springfield artisan of the same period, was the first to conceive the idea of adjusting nuts with a wrench, and by way of proof of their claim they emphasize that the simian contraction of his name has survived for a century, and is the most common derivation applied to that type of tool. An effort was made some forty years ago to trace the whereabouts of Monckey, who was reported to have migrated to Texas, but the quest was unsuccessful. Those most familiar with the history of Springfield are unanimous in the belief that the Monckey, or Monkey wrench, as it is known today, is a misnomer insofar as its nomenclature connects it with Charlie Monckey, and that full credit for the invention should be accorded Solymon Merrick. It seems to be undisputed that the latter contrived and adapted the wrench, with a threaded bar which permitted the jaw of the tool to be adjusted to the size of the nut.

In 1835, Stephen C. Bemis, who became the seventh mayor of the city of Springfield, during the trying days of the Civil War, and one of its most prominent and respected citizens, and who had begun his business career as a clerk in his uncle's hardware store, in the section of Springfield which became the town of Chicopee, in 1848, set up a factory, at Willimansett, for the manufacture of woolen machine cards, augers and machine tools and there produced the Merrick monkey wrench. The con-

cern early took high rank in its field, also producing cast steel dividers, compasses and calipers, its commodities receiving first awards at the American institute, the Mechanics Association, and elsewhere.

Mr. Bemis also carried on the retail store, which he purchased from his uncle, and removed it to the north side of Taylor Street in Springfield, where he operated it under the name of S. C. Bemis & Co. Soon he became the leading hardware merchant of western Massachusetts, and his store and warehouse were no insignificant factors in encouraging the growth of small manufacturing enterprises in that section of the town. One of his partners was Chester W. Chapin, who later became president of the Boston & Albany Railroad Co. Bemis subsequently withdrew from the retail business in order to devote all of his attention to his manufactory, but his move had scarcely been consummated when his Willimansett factory was destroyed by fire, and he left Springfield to engage in the hardware business, in Troy, N. Y. Returning to his native heath, in 1843, he resumed the manufacture of small tools, in a plant located on Mill River, and operated under the name of Bemis & Call, with Amos Call as the junior partner. The Bemis & Call Co. was incorporated in 1855, with capital of $26,400.

His son, William C. Bemis, later became associated with him in the business, served for many years as treasurer, and from 1897 to 1904 he was both president and treasurer of the organization. Howard R. Bemis, grandson of the founder, in turn became the head of the Bemis & Call Company, and its president, while serving as vice president of the Fiberloid corporation and as a director of several other large concerns in the city. John C. Beggs is treasurer of the company, and Edwin L. Bemis is secretary.

It is an interesting coincidence that in 1928 the Bemis & Call Company purchased the wrench business of the Coes Wrench Company, of Worcester, and transferred the manufacture of the Coes line of monkey wrenches from the latter city to Springfield, thus giving the local concern a greater diversity of production.

In 1839, Loring and Avery Coes, despairing over the loss by fire of their wood-working mill, in Worcester, removed to Springfield, where they secured work as pattern-makers in a foundry located opposite the present site of the plant of the Bemis & Call Company. Observing an imperfection in the efficiency of Solymon Merrick's wrench, which required the use of both hands of the artisan in opening and closing it, Loring Coes set about to improve the tool in such a way as to open the wrench with one hand, leaving the other free, and thus became the originator of the screw wrench. Returning to Worcester, in November, 1840, he secured a patent on April 16, 1841, and began the production of his device, which soon became so popular that it is said it can be purchased "from Alaska to Argentina, and from Korea to the Cape Colony."

And now after nearly ninety years the Coes wrench has returned to almost the spot where its inventor produced his first model, and has joined Merrick's Springfield creation.

One hundred hands are employed in the Bemis & Call Company's plant, and the corporation has capital of $500,000. Howard R. Bemis is president, William C. Bemis, secretary, and John C. Beggs, treasurer.

On December 20, 1837, William Hobbs, of Springfield, was granted a patent on secret safety locks, and the same year the Springfield Satinet Company came into being and flourished for twenty years.

THE INDIAN ORCHARD COMPANY

The industrial beginnings of the Indian Orchard section of Springfield date back to 1821, when the Springfield Manufacturing Company was organized and built a plant on the Ludlow side of the Chicopee River, while nearly all of its employees lived on the Springfield bank.

The Indian Orchard Company is located in the village bearing that name, which is a part of the City of Springfield. Its predecessor was the Indian Orchard Canal Company, incorporated in 1839, which acquired the water power and completed the dam. In 1853 the Canal Company was succeeded by the Ward Manufacturing Company, which erected a factory and commenced the manufacture of cotton cloth. In 1859 a new company was organized, adopting the name of the Indian Orchard Mills. This concern was successful in the manufacture of sheetings, until its mill No. 2 was destroyed by fire, in 1886.

On April 28, 1890, the present Indian Orchard Company was incorporated, with capital of $225,000. The business steadily increased and a new mill was completed in 1900, which was equipped with a new power plant and new machinery, and the capital was increased to $350,000. In 1915, the capital stock of the company was again increased, bringing it up to $600,000.

The concern is the parent organization of the thriving and diversified industries which form Springfield's easterly ward, and it has played a prominent part in the history of that section of the city, as well as providing the essential products for a large part of the textile industry of New England. The plant consists of four mills, and a large dye works, and employs upwards of 350 hands. It uses in the course of a year about 5,000 bales of cotton, which, if employed solely in making yarn, would provide enough in a year to girdle the globe 1,400 times. A large part of the company's business is the making of cotton warps, which it furnishes to clothing manufacturers and makers of piece goods, and frequently the cotton that is prepared at the Indian Orchard Company's plant finds its way back to Springfield in the upholstery of an automobile, or in a breezy Palm Beach suit.

The concern operates the only yarn spinning mill in Springfield, and for forty years has been famous for its cotton warps, novelty yarns and white and colored cotton for the woolen and worsted trades, with stock-dyed and yarn-dyed yarns, furnished in chain or ball warps, jack spools, loom beams, tubes or cones, sized for weaving or unsized as required and carded colored cottons and blended stocks, all double carded.

Recently the company has specialized in producing novelties in cotton, worsted and silk and rayon in flakes, nubs, ratinet and twists.

Winsor B. Day is president, and Walter L. Spaulding treasurer and clerk.

THE SPRINGFIELD PLATING WORKS

In 1839, D. Schoonmaker founded what today are known as the Springfield Plating Works, a concern which, with its predecessors, has become an institution on Taylor Street. Schoonmaker was a pioneer in developing on this thoroughfare its reputation as the home of small industries.

As goldsmith and silversmith he enjoyed the patronage of leading families of the vicinity. The business passed to his son and has been carried on through the years by various owners. At present silver plating

constitutes the main product, but nickel, brass, and copper plating and oxidizing are also carried on.

While the small goldsmith's and silversmith's shop may suffer in some respects in comparison with former times, owing to changed conditions, new factors have arisen that contribute to the activities of the Springfield Plating Works, particularly in the automobile field, while the bicycle still remains a source of income.

The Springfield Plating Works is now owned by Matthew Traster. He and Claude Violi purchased the business in March, 1928, from Frank Starin, and the following September Mr. Traster purchased Mr. Violi's interest.

CHARLES GOODYEAR BEGINS RUBBER MANUFACTURING IN SPRINGFIELD

Charles Goodyear, a bankrupt hardware merchant of Philadelphia, a native of New Haven, Conn., and the son of a manufacturer of that state, acquired by inheritance and environment a considerable inventive ability. Firm in the conviction that he saw in the products of the Roxbury Rubber Company, of Boston, an opportunity to retrieve his fortune, he called at the New York offices of the corporation, on the occasion of a visit to that city, and examined some of the goods on display. Giving evidence of much intelligence in offering suggestions as to improvements, the company's agent, struck by his perspicacity, confided to him that the entire rubber industry of that era, notwithstanding its seeming prosperity, was but a bubble that must soon burst—that the rubber shoes, blankets, and coats were being returned daily because the rubber melted and stuck in summer, and stiffened and cracked in winter. By way of encouragement, he added that the man who could overcome these difficulties had a fortune in his grasp.

Returning to Philadelphia, Goodyear, who was placed in jail as a poor debtor, began that series of experiments, with a little lump of rubber and no tools but his fingers, which was to continue until his death, twenty-seven years later, and which were carried on under circumstances of the greatest privation.

So absorbed did he become in the work, and so dominated was he by it, that from 1835 to 1836 no distress of physical pain or no enticements of wealth served to swerve him from his fixed purpose to solve the vexing problem. Three different times he thought he had reached the solution, first, when he mixed crude rubber with magnesia; second, when he boiled this compound in quicklime and water; and third, when he washed the surface of this mixture with nitric acid. But in each instance apparent success was turned into utter and disheartening failure. Several long and weary years passed from the time he began his experiments until he discovered that the two things necessary to render crude rubber an article of commercial utility under all weather conditions were heat and sulphur. The story of his sitting by the stove expounding his theories to a group of incredulous neighbors, and of how, in the enthusiasm of his gestures, he struck a handful of sulphur and rubber on the hot stove, thus accidentally discovering the secret of vulcanization, has become commonplace. Not until two years later was he able to interest capital in his new process of vulcanizing rubber, but, in 1840, two New York capitalists built a factory for him, at Springfield, and four years afterwards he received his first patent for preparing rubber, and began to dispose of licenses for the manufacture of rubber commodities, under this grant. Leverett Candee bought the right to manufacture rubber boots and shoes;

the Goodyear India Rubber Glove Manufacturing Company, the right to produce rubber gloves; Daniel Hidgman, of New York, the privilege to manufacture door springs, and various other licenses followed.

In 1841, the Dwight Manufacturing Company was incorporated with $500,000 capital to engage in cotton goods manufacture in Springfield, but since 1848 this concern has been one of the industries of Chicopee.

PURVEYING COFFEE TO WESTERN MASSACHUSETTS

The firm of Charles E. Brown & Co. dates its career from 1842, when the wholesale grocery house of J. W. Hale & Co. was established. This early firm did business in the Elm Street building now occupied by Newrie D. Winter, one of the oldest structures in the city. The concern was succeeded by West, Stone & Co., which firm was absorbed by Charles E. Brown & Co., in 1901, and the business was removed to Lyman Street. Since the death of Charles E. Brown, in 1908, the concern has been managed by Fred R. Brown.

In 1928, new equipment was installed in the plant, devoted to the roasting, grinding and packing of coffee for the northeastern market, which doubled its capacity. New motors, roasters, grinders, and a belt conveyer system, were added. The company early marketed the "Massasoit" brand, and in recent years added the "Nayasset" and "Miles Morgan" coffees.

THE CHENEY BIGELOW WIRE WORKS

In 1842 the Cheney Bigelow Wire Works were established when Cheney Bigelow began the manufacture of corn-poppers, flour sieves, ash sifters, and foundry riddles. He also operated two or three narrow hand looms for weaving light weight wire cloth, thirty-six inches wide, the product of which no doubt entered into his commodities. The records of the concern between 1852 and 1879 are missing, but it was during that period that the founder died, and the management devolved upon his son-in-law, W. D. Stevens. About 1878 or 1879 the company began the manufacture of heavy iron wire work, such as window guards, office railings and elevator enclosures, and later heavier and more elaborate grille work was undertaken. In 1878 the concern interested itself in producing dandy rolls for paper machines. In 1880, five narrow hand looms, the widest being a 100-inch machine, which was wider than any existing paper machine, were in operation, at the plant. In 1887 the concern was incorporated with capital of $90,000, and two years later the plant at the corner of Dwight and Taylor streets was erected. In 1889, it bought the factory formerly used by the Warwick Cycle Manufacturing Company, and in 1905 it erected a second factory there, while in 1920 Factory No. 3 was built.

In 1882 it began building looms for weaving brass wire cloth and Fourdrinier wires for paper machines, and today upwards of sixty of the latest type automatic power looms are operated, among which are several capable of weaving the widest Fourdrinier wires used on fast running newsprint machines. Cylinder molds of extremely large size to meet the demands of the modern paper industry are also turned out at the plant by new and up-to-date equipment.

The company also specializes in designing, producing, and installing wire signs, some of which, in rain and shine, have done service for a half century, standing as imposing monuments to the quality products turned out at the plant.

In 1927 the corporation was reorganized, and Le Roy E. Bartlett, who had been with the concern for thirty years, and who had risen to the vice presidency, was chosen president. W. Bruce Pirnie became treasurer and chairman of the board of directors, Guy M. Peterson vice president, J. Harold Graves assistant treasurer, and Ralph Freeman assistant manager.

One of the first steps taken by the new management was to inaugurate an educational campaign, delineating the manufacture of paper mill equipment. A motion picture showing the successive steps in the making of Fourdrinier wires was filmed and has been shown at meetings of paper mill representatives and other gatherings throughout the country, each salesman being provided with a copy of the film for effective use.

In addition to this new feature, a series of large folders, printed in colors, set forth the ten principal steps in making Fourdrinier wires, a large halftone engraving supplementing the text in each instance, and these publications were followed by an educational folder on the subject of watermarks in paper. All standard designs of watermarks are made in the Cheney Bigelow establishment.

Fourdrinier wires are woven at the plant in varying degrees of fineness, from 40 to 100 meshes to the inch. They are made of brass and bronze and come from the wire mills in skeins. Of a diameter of .028 when received, the wire is drawn through a series of dies and reduced as fine as .004½ in diameter. It is then put through a furnace to be annealed, after which it is wound on spools and on bobbins. The fourth step consists of beaming on the wire, which is accomplished by means of a creel that holds the bobbins temporarily. Next comes the process of threading in the wire, an operation for skilled craftsmen only, each wire being threaded in separately. The sixth step is that of weaving the wire, which is done by workers who are thoroughly accomplished in the art.

Sewing the wire, a work of deft fingers, is the next step, and then it goes to a stretching table, and while being stretched to the proper size it is inspected while rotating slowly over large rolls. The ninth step, known as boxing the wire, involves several operations. After it has been wound on three rollers to prevent creasing, securely wrapped in heavy paper and tied, it is packed in a box made especially for that particular type of wire and it is then ready for shipment.

One of the new developments is the use of a soldered seam for wire, as a substitute for the older method of edging. Another recent introduction is a zigzag wire, used in cases where wire is subjected to unusual wear.

In addition the Cheney Bigelow firm produces cylinder faces and cut cloth ranging from 14 to 150 meshes to the inch, in brass or bronze, and wire of monel metal from 14 to 50 meshes to the inch. Corduroy cloth for dandy rolls and tin bronze wire are other products.

Substantial gains in volume of business and profits have followed the rejuvenation of the company, which now employs upwards of 125 operatives.

W. Bruce Pirnie is president and treasurer, G. M. Peterson, vice president, and Ralph E. Freeman, secretary of the corporation, which has capital of $625,000.

THE ROMANCE OF THE KIBBE BROTHERS COMPANY

The story of the present Kibbe Brothers Company runs back more than a hundred years to a modest country home, where the Kibbes, then

boys, made and sold home-made candies to their schoolmates in a little district schoolhouse.

The next step in the progress of the concern was taken in 1843, when a one-room candy shop, located at the corner of Sanford and Market streets, was established by Horace Kibbe, having for its original equipment a coal furnace, a kettle or two, a few bottles of flavoring extracts, and a barrel or two of sugar. Confectionery making in that era was of simple form, consisting simply of sugar modified by cooking it into stick candy, peppermint drops, and a few other varieties. But by sticking to the highest quality, the reputation of the shop was extended, the demand for its sweets grew, and ere long the territory served extended far beyond the territorial limits of Springfield.

There were then no railroad systems to serve the Messrs. Kibbe, but they created their own transportation agency. George and Horace Kibbe were ardent horsemen, and their task was to design a vehicle which would fully meet their requirements, and they evolved a candy coach, unique and unusual—nothing like it having been seen before.

The driver sat forward on an elevated seat, well protected by a collapsible top. The main body of the coach was divided into compartments, which were easily reached. The body was painted maroon, while the wheels and gear were bright yellow, and on each side there was a panel picture, one being particularly popular with the boys and girls of that day, as it portrayed a Wild West rider riding at full speed on his broncho in pursuit of buffalo.

The horses, four in number, were snow-white and selected for their beauty as well as their utility. White horses were used because George Kibbe insisted that there would never be any doubt whether a white horse was clean. Eventually, eight of these coaches were built and they covered New England in all directions, some routes extending a hundred miles from the factory.

Sales were made at stores along the route and cash collected for the goods delivered. Payment was largely made in copper pennies, which were loaded into a safety compartment in the wagon, and brought back to the factory, where a group of young women were kept busy rolling them into uniform bundles of twenty-five, preparatory to their being deposited in a bank.

By 1888 transportation facilities had developed to such an extent that the last of the four-in-hand candy coaches was withdrawn from the road, and all shipments were made by freight.

In 1910 Kibbe Brothers Company laid the foundation for a fleet of motor trucks, designed to cover practically the same territory as the old four-in-hand candy coaches. The practice in this case, however, was vastly different than in the old days, the mail orders received from the salesmen being packed at the factory and delivered the following day by the trucks. This type of delivery is now used at all points within a hundred miles of the plant. To more remote points rail shipments are made.

During the time the transportation system was undergoing a change, equally important alterations were made in the factory. The original plant was outgrown, and the company took over an entire building at the corner of Main Street and Harrison Avenue. In 1890 ground was broken for a new plant at 37 Harrison Avenue, which was added to from year to year until today it occupies practically the entire block bounded by Harrison Avenue, and Dwight, New and Market streets.

In 1926 the company purchased the Handy Chocolate Company and

fifteen acres of land on Berkshire Avenue, which serve as the site of a new, modern factory, away from the congestion of the city, and surrounded by fresh air and sunshine.

The present plant is equipped with the most modern machinery and candy is produced by skilled workmen who have learned their trade from the master workmen who created Kibbes candies.

This, the oldest candy house in New England, is also known today as "The House of a Thousand Candies." Upwards of 300 operatives are employed.

R. R. Cleeland is president, A. B. Sanderson secretary, and Charles C. McElwain treasurer, of the corporation, whose capital has grown from the few pennies which the Kibbe boys invested in raw materials a hundred years ago to $1,000,000 today.

In 1846, the R. F. Hawkins Iron Works were established to produce the Howe truss bridge, and were incorporated in 1868.

THE SPRINGFIELD GAS LIGHT COMPANY

On February 10, 1847, the Springfield Gas Light Company became a factor in the industrial life of the community, and agreed to furnish gas illumination for thirty-eight street lights, located on Main and State streets, the poles to be erected by the Town of Springfield and the service to be provided "except when the sun is above the horizon." At the turn of the twentieth century the company became part of the C. H. Tenney Company interests and its growth during the past twenty-five years has been little short of phenomenal.

With 1926 a year in which all local records for output of gas were broken, the company began 1927 with hope for increased business, but with little expectation that the previous year's mark would be bettered. On December 31, 1927, it found, however, that the output for the twelve months had exceeded the 1926 figure by 25,000,000 cubic feet.

The gas output for 1927 was 1,945,000,000 cubic feet, as against 1,920,000,000 cubic feet in 1926, and no small part of the total was for industrial purposes, as the company serves many manufacturing plants in Springfield and Holyoke.

It has capital of $3,795,200 and employs 500 workers.

Charles H. Tenney is president, D. Edgar Manson first vice president, Albert B. Tenney second vice president, F. L. Ball, third vice president, H. E. Hagar, clerk, and V. L. Ewig treasurer.

The Springfield Car & Engine Company was organized in 1847, with capital of $100,000 for the manufacture of locomotives and cars, but as the field had been pre-empted by old and well-established concerns, it was found after twelve months' operation that it would prove advantageous to dispose of the machinery and lease the buildings.

Messrs. Blanchard & Kimball took over the locomotive end and T. W. Wason & Company acquired the foundry and car departments. Blanchard & Kimball really succeeded the Springfield Locomotive-Manufacturing Company, which, within one month after its organization, in 1852, had the misfortune, by the death of E. Ripley, to lose its main dependence for furnishing the capital necessary to carry on the works. J. M. Blanchard and William C. Averill assumed the liabilities of the concern, and prosecuted the business under the firm name of Blanchard, Averill & Co., until April, 1853, when Mr. Averill was caught in the machinery and killed.

The shops turned out ten locomotives per month, besides stationary

steam engines. Blanchard was a practical locomotive builder, having been an engineer on the New York Central and other roads for several years before entering the manufacturing field. He invented a feature by which the eccentric and connecting rods of a locomotive were brought on a level with the axle and the center of the cylinder, thereby not only shortening the rods, but effecting great economy in the use of steam.

In 1848, Erastus Stebbins, who had received a patent on a water faucet, formed the E. Stebbins Manufacturing Company, and located his manufacturing plant in Chicopee, removing it to Springfield in 1861, and incorporating the concern February 13, 1868, with capital of $50,000.

SMITH & WESSON, INC.

The outbreak of the Civil War was in large measure responsible for the growth and success in the early days of the Smith & Wesson Revolver Company, established in 1847 by Horace Smith and Daniel B. Wesson.

During the first year of operation the company's products were valued at $150,000. In 1860, Messrs. Smith and Wesson secured a patent on pistols, carrying metallic cartridges, in which the fulminate was enclosed in the hollow, annular, projecting base—a principle later adopted by most manufacturers of metallic cartridges, designed for breech-loading arms.

The Union Army was furnished with a large number of pistols by the local concern and the firm's reputation had been well established even before Fort Sumter was fired upon.

In 1870, the company filled a contract for 200,000 revolvers for the Russian army, and by 1880 the annual business amounted to $800,000.

Today, Smith & Wesson, Inc., has capital of $2,500,000, and employs 600 operatives, in the production of revolvers and pistols. Harold Wesson is president, Douglas B. Wesson vice president, George P. Chapin secretary, F. H. Wesson treasurer, and Victor H. Wesson assistant treasurer.

In 1850 the Springfield Machine Company was incorporated, with $150,000 capital.

THE INDUSTRIAL PICTURE IN 1852

In 1852, when Springfield became a city, it possessed thirty-four manufacturing establishments, including the Springfield Armory. There was a pump factory which employed four men; a powder flask plant, with twelve employees; a flour mill, employing nine men; and numerous other small industries, with from fifteen to fifty workmen on their payrolls.

The Armory, with an average of 382 employees, was bigger than any three establishments put together. The American Machine Works came second with 130 employees, the Wason Car Works were third with from 90 to 100 workmen, and the Springfield Arms Company was fourth with 60 employees.

And yet these little parent industries were diversified. Metal working in one form or another was predominant. Arms, powder flasks, percussion caps, hardware, gold chains, car wheels and various other machine shop and foundry products were manufactured locally. There were factories for the making of cars, pumps, rubber webbing, boots and candy. There were flour and lumber mills, and printing shops were numerous. Stone & Harris had started their important bridge-building business.

The Ames Paper Mills, on Mill River, were then in operation, though they were soon to fail in spite of the importance of John Ames' inventions of paper-making machinery.

THE HAMPDEN PAINT & CHEMICAL COMPANY

The Hampden Paint & Chemical Company was incorporated in 1852, with capital of $100,000, and this concern, now seventy-eight years old, still manufactures paints, colors, varnishes, waterproofing compounds, and chemicals.

It has capital of $150,000 and employs fifty operatives, R. Kingsley Baker is president and treasurer, A. A. Hastings vice president, and C. C. Carlson secretary.

In 1854 the American Hardware Company was incorporated, with $150,000 capital.

The Springfield Tool Company was incorporated about 1855, with capital of $25,000, and built a three-story plant, 100 by 45 feet, adjoining the tracks of the Western Railroad, which was equipped with steam-driven machinery for the manufacture of all kinds of machine tools.

THE POWERS PAPER COMPANY

Seventy-three years of existence, having been established in 1857, only five years after the Town of Springfield became a city, is the claim to recognition of the Powers Paper Company, which was founded by Lewis J. Powers, and which has become one of the largest individual manufacturers of fine stationery, papeteries and tablets in the country. The manufacture of writing tablets was introduced into Springfield by this concern, whose products are now sold throughout the United States and in many foreign countries. They include papeteries, or boxed writing paper, composition books, pound paper, fine stationery and commercial envelopes of all kinds.

The present factory was built in 1909 and at that time ranked as one of the largest single unit plants in the city, containing 180,000 feet of floor space and covering four acres.

Upwards of 300 operatives are employed, and the company has capital of $200,000. The officers are Frank B., Lewis J., Philip C., and Walter C. Powers, all sons of the founder.

THE MILTON BRADLEY COMPANY

Not even the dark clouds of the Civil War seriously retarded the continuing industrial advance of Springfield. In 1860 the Milton Bradley Company came into being, although it was not incorporated until twenty-four years later. It is still recognized as one of the city's most progressive and growing units.

In the products of this concern one finds a convincing argument to the effect that inventive genius is not dead in Massachusetts and that up-to-the-minute ideas are quickly adopted. When Colonel Lindbergh completed his flight to Paris this Springfield company quickly sensed the fact that aviation was bound to be a leading keynote in the toy trade. At 11 o'clock in the morning the suggestion came from one of the officials of the Milton Bradley Company that Lindbergh's trip be capitalized, and by 2 o'clock that afternoon the idea of what proved to be a popular hit, the "Flight to Paris," had been worked out in outline. The following morning the company's artists received orders to rush the drawings for the job—a board game executed in eight colors. One color plate was prepared and was on the printing press before some of the others had been started, and the process was maintained at top speed. Advertising was prepared and dispatched, and in eleven days from the time the project was con-

ceived the first shipment of the new game was on its way to New York City, and the "Flight to Paris" was on sale the very day that Lindbergh reached the metropolis. And so it goes. Comic strips appearing in the daily and Sunday newspapers are drawn upon for material for games, and novel ideas are seized upon daily, all of which are typical of the spirit of hustling that has pervaded Massachusetts manufacturers from the beginning of industry.

The contributions of the company to the promotion of a better and happier childhood, through the manufacture of kindergarten and school supplies, games and educational home amusements, water colors and crayons for school and home, quality books for children, and the magazine, *American Childhood,* for mothers and teachers, have exercised a marked influence upon American life.

The plant is equipped with complete facilities for lithography, fine color and offset printing, and for the production of commercial stationery, and, in addition to its Springfield office, it maintains a salesroom, at 120 Boylston Street, Boston.

The corporation has capital of $1,850,000 and employs upwards of 1,000 hands.

E. O. Clark is president, Ralph W. Ellis, treasurer and F. P. Klein, secretary.

LOCAL MANUFACTURING STATISTICS OF THE CIVIL WAR PERIOD

In 1860, Springfield had thirty-seven manufacturing establishments, capitalized for $1,074,000, in which 1,100 men and 637 women were employed, and the products of which were valued at $2,065,594, exclusive of the arms manufactured at the United States Armory.

With the advent of war, the production of guns increased at the Armory. Boom times arrived. The number of workmen employed there jumped to 3,000 in 1864. Every house in town was overcrowded from basement to attic.

But when the war was over, there was no decline in population. On the contrary there came industrial development, with the building of new factories and new homes and the population rose to 22,035, by 1865.

SPRINGFIELD CENTER OF THE WRITING PAPER MANUFACTURERS' ASSOCIATION

Massachusetts is charged by her critics as being behind the times in many industrial activities, but certainly this cannot be attributed to her paper manufacturers, inasmuch as the first trade organization of any kind or nature formed in the United States of America was the Writing Paper Manufacturers' Association, whose charter, adopted at Pittsfield, on February 13, 1861, is preserved in the headquarters of the organization, at Springfield. For at least a decade prior to that time the Bay State paper producers had been meeting at intervals but without any fixed organization.

Although some sixty years ago the membership was confined chiefly to New England manufacturers, because at that period most of the writing paper mills were located in this section, it has long since become a distinctly national organization. In 1860, the year before the group organized, the daily production of the writing paper mills in the United States was thirty-eight tons. Today, it is 1,000 tons, and over this same period the annual gross sales of writing paper have increased from $5,000,000 to $90,000,000.

Of the forty-seven members connected with the Writing Paper Manu-

facturers' Association today, twenty-two are in Massachusetts, two in Maine, two in New Hampshire, and one in Connecticut, thus giving New England twenty-seven or more than 57 per cent of the membership and Massachusetts very nearly 50 per cent of the whole.

The importance of Massachusetts in the production of the higher grades of paper is shown by the fact that, according to recent figures, $34,000,000 of the $90,000,000 value of writing paper is manufactured in this state, while $2,000,000 of the $5,000,000 worth of cover paper; $22,000,000 of the $141,000,000 worth of book paper, which includes the kind used in magazines; and $2,800,000 of the $10,000,000 worth of high grade tissue paper are produced in this Commonwealth. Combining these branches of the fine paper industry it is observed that $60,800,000 out of the total $246,000,000 value is produced in Massachusetts, or about 25 per cent of the whole.

Of 746 paper establishments of all kinds in the United States, eighty-two are located in Massachusetts, or about 11 per cent, and they employ 15,000 workers.

In 1863, Leonard L. Davis invented the bolt-heading machine which bore his name—a device designed to meet a long-felt want in forge shops of all classes, and which superseded the hand-heading tool which long had been in use. Two years later he sold the patents upon this machine, and devoted his attention to an improved spirit-level, upon which he secured three patents in 1867 and 1868, in this country, and in Great Britain and France. He began the manufacture of these devices in Springfield, and extended the line of production to include planes, calipers and dividers, forming the Davis Level & Tool Company, in 1872, and building a brick factory, in the Brightwood district, three years later.

D. H. Brigham & Co. began the manufacture of paper collars, in 1863, and a short time later the Springfield Collar Company was organized.

In 1864 the Barney & Berry Skate Company was formed, later reaching a production of from 75,000 to 100,000 pairs of skates annually. It produced 500 pairs by hand-work the first year of its existence, and by 1878, when the plant was completely equipped with machinery, this total rose to 80,000 pairs.

In 1864, Newell Bros. Manufacturing Company removed to Springfield, from Longmeadow, where the concern had established itself in 1848.

THE BEGINNINGS OF THE UNITED STATES ENVELOPE COMPANY

In 1864, Elisha Morgan and William Slater founded the Morgan Envelope Company, the latter remaining with the concern, as superintendent, until 1920, several years after its merger with the United States Envelope Company.

He was the inventor of many of the mechanical devices now in common use in the envelope industry, and early in his association with Mr. Morgan was given the responsibility of devising the many machines required to produce envelopes.

Among the many inventions he made and perfected was the so-called Slater machine used in the manufacture of envelopes for many years. He also devised a machine to manufacture the first "out look" or window envelope with the transparent piece of paper in the front making it possible to read the address on the folder or circular inside.

In 1873 the Morgan company was the first successful bidder to manufacture government postal cards, which were started in that year, and Mr. Slater had the responsibility of developing machines for this work.

At the time of his death, in 1929, he was one of the last of the pioneers of the local envelope industry. After 1874, the Morgan company manufactured 50 per cent of all the government envelopes produced in America.

The United States Envelope Company operates three of its thirteen units in Springfield—the Morgan Envelope Company, managed by W. B. Sleigh, where plain and printed envelopes are manufactured; the Morgan Tissue Paper Company, managed by R. J. Black, where tissue paper is manufactured, and the P. P. Kellogg & Co. Division, in charge of E. V. Johnson, where envelopes and greeting cards are produced.

The most striking of the greeting card lines recently put out by the Kellogg division is represented by the Kellogg des Arts Modernes envelopes, in twelve unusual patterns, designed and manufactured in the local establishment. Linings placed in these envelopes include a number of choice importations of the latest styles, among these being hand-blocked French and English papers, in which colored bronzes not hitherto seen are prominently in evidence. Others, like the exquisite mother-of-pearl, make their appeal chiefly through the delicate beauty expressed. Each shape of envelope in this line is individually distinctive and this shape, no less than the color effect, is carefully adapted to match the particular lining used. Viewed as a whole, this line gives the peculiar thrill that comes from viewing a new offering that is daring and unusual in its appeal.

The polychrome line, which has been one of the most popular of this concern's recent introductions, is produced in the most fetching color composites, to match all kinds and sizes of envelopes.

Another new line is termed etching vellum, so called because the surface of the paper is like that commonly used for etchings. In addition to the regular line this is produced in rougher effects, and in general the offering may be said to have struck a new note.

The French deckle envelopes, sheets and cards, made by a process that the Kellogg division controls and bearing a close resemblance to the deckle produced by paper mill machines, have found a prominent place in the trade.

The influence of the Kellogg division in producing new designs and its efficient sales organization, is conceded to have been a big factor in promoting the phenomenal growth of the greeting card business, and its part in promoting other means of increasing volume sales of envelopes is none the less outstanding.

An example of this is observed in the exquisite book illustrating the use of Della Robbia papers, a de luxe publication put out in a limited edition for circulation in the printing and stationery trades and among those who for any reason take a special interest in fine printing. It is said to be the finest work in its line ever produced and has taken rank as a museum piece and is a valued possession in the artists' studios so fortunate as to be numbered among its possessors.

This interesting work was the conception of E. V. Johnson, manager of the division and vice president and assistant general manager of the United States Envelope Company, who summoned a number of the foremost artists, designers and printers in this country to consult and coöperate in making the work one of distinction and importance as an advanced product of the graphic arts. Each page exemplifies a particular style and process of printing and is treated as a unit. Such men as Joseph Pennell, the etcher; C. B. Falls, the mural painter; Jerry Drew, the pictorial photographer; Adolph Treidler, the poster designer, and O. W. Jaquish and Edward A. Wilson, the cover designers, contributed to its contents. O. W.

Jaquish was in charge of the general design of the work and it was produced under the supervision of William Edwin Rudge of New York. Master printers in different American cities had a hand in printing the pages and half a dozen processes of engraving are represented.

Della Robbia is an imitation of an Italian hand-made paper, and in demonstrating its possibilities for use in books, covers and announcements, as well as being a general object-lesson of fine printing, this publication is an unquestioned success.

Another distinctive line is the manufacture by this division of envelopes of glassine paper, employed to enclose toilet goods, shirts and collars, candy, cigarets and packages of innumerable descriptions entering into commerce. This line requires special machinery and expert workmanship.

Since the United States Envelope Company was organized the P. P. Kellogg Division has advanced from next to the smallest unit to a place near the top of the list. Thus this lineal descendant of the old P. P. Kellogg Company has enjoyed remarkable growth. Its operations occupy more than half the space in the United States Envelope Company's great building between Cypress Street and the Boston & Albany tracks, and its sales have more than tripled in the last six years. Its space was recently enlarged by the occupancy of the quarters vacated by the Morgan stationery division, which was discontinued, in 1928.

The Kellogg Division has become a world leader in the production of greeting card specialties and envelopes sold in conjunction, not only for the holiday season but during the rest of the year, for such missives continue to mount in public favor for all sorts of occasions, due to the enterprise of manufacturers and their designers, supplementing the clever resourcefulness of artists, verse-writers and phrase-makers in coïning sentiments to fit every mood and association. This is an age when many interests compete with that of letter writing and the greeting card furnishes a ready answer for many social and friendship obligations.

Every year sees an amazing advance in variety, quality and attractiveness of the cards and envelopes made for the greeting card trade, and in meeting the demand for beauty, novelty and bizarre designs, the influence of modern art is quite strongly reflected in the company's new lines, while its zeal in producing new decorative and color effect is unremitting.

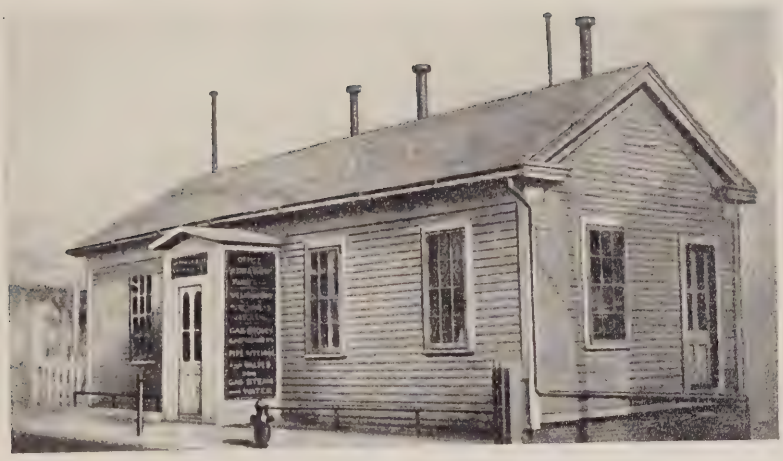
It is said that Americans have lately come into a new color-consciousness, and this is exemplified in greeting cards along with other things. It is manifest in the gorgeous tissue linings of the envelopes and also in the two-tone and polychrome effects that distinguish cards and envelopes along with the color schemes of printed designs.

The outstanding success attained by the Kellogg Division in this field furnishes an example of the capacity still resident in Massachusetts manufacturing concerns, not merely to maintain prestige previously won, but to develop leadership in a new line of enterprise.

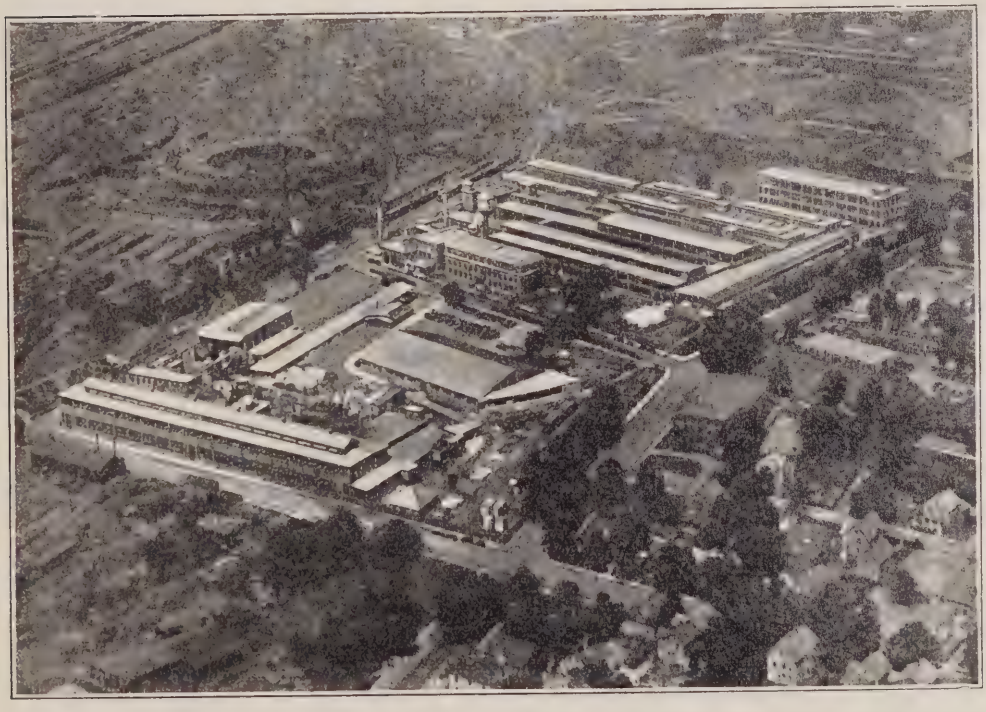
THE GILBERT & BARKER MANUFACTURING COMPANY

When you drive by a filling station on any of our many improved highways and observe the attractive Socony gasoline pump beckoning to you to "fill up"—the symbol of a distributing system that has made motor fuel available in every nook and corner of the Commonwealth—do you give a thought to who provided this modern necessity?

It was not so very long ago that gasoline pumps were almost an unknown quantity. Prior to 1910 very few measuring pumps of any kind



FIRST OFFICE OF THE GILBERT & BARKER MANUFACTURING COMPANY, WEST SPRINGFIELD



AERIAL VIEW OF THE GILBERT & BARKER MANUFACTURING COMPANY, SPRINGFIELD, 1928

were in use. Gasoline was distributed in cans and tanks by methods that were slow, wasteful, and dangerous to human life.

Like many another Massachusetts enterprise, the genesis of the present Gilbert & Barker Manufacturing Company can be traced to an accident, and in order that avoidance of the serious consequences that befell one of its founders might be assured it became a manufacturing entity.

Just previous to the Civil War a young man in the employ of the United States Governmental Arsenal, in Springfield, was severely burned in a fire caused by a defective gas machine. That experience not only was not forgotten by him, but it literally burned into his mind the need for a safer, better, and more dependable apparatus. During the years immediately following he centered his unusual mechanical ability and inventive genius on the problem of designing a gas machine, from which all possibility of danger would be eliminated. Possessing definite ideas as to its construction, he interested a friend in financing the device, and, in 1865, they established the Springfield Gas & Machine Company, to manufacture apparatus for expanding gasoline into gas for lighting and heating purposes, at a period when gasoline was a by-product of kerosene, and a drug on the market.

The inventor who had been the victim of the Armory accident was J. F. Barker. His financial backer was C. N. Gilbert.

Little did they dream of what the future held for the company they founded. The Springfield gas machine, as the first product was termed, was an apparatus that utilized gasoline of high gravity (86° to 90°), and from it generated a gas that lighted and heated hotels, public buildings, and residences, and because of its safety, economy, dependability, and novelty, it quickly won its way to popular favor, and installations were made in the Princess and Hamilton Hotels, in Bermuda, in the palace of King Kalakaua, in Honolulu, in hostelries in Florida, and in the residences of many noted personages of the era.

The experience and knowledge gained in the early years of the enterprise by Messrs. Gilbert and Barker in handling this hazardous liquid stood the Gilbert & Barker Manufacturing Company—for such it became when it was incorporated on March 31, 1870, with capital of $40,000—in good stead when manufacturing activities were later centered on building gasoline pumps and tanks for distributing gasoline to the ever-increasing number of automobiles. It was during the early seventies that the company employed as a draughtsman, a young man whose ability as an inventor and scientist later brought him international renown, and who became Sir Hiram Maxim, when he was knighted by the British Crown.

The success of the company's gas machine encouraged its founders to gradually broaden its business to include the manufacture of accessory products using the gas produced by the machine, these devices including such equipment as laundry stoves, hat-form heaters, burners for cloth singeing, incandescent burners, and finally reached a climax in the designing and patenting of the first automatic gas hot-water heater ever manufactured in the United States.

Messrs. Gilbert and Barker next directed their attention to the industrial field, and sensing the vast possibilities of fuel oil as a source of heat for metallurgical processes, they introduced, in 1889, the Gilbert & Barker oil burning system, and a line of oil burning furnaces, which became so generally used that the list of enterprises installing this equipment comprised a veritable and complete blue book of industry. A few years later,

a line of gas burning furnaces was developed to round out the company's industrial heating equipment.

Then there entered into the situation factors which seemed to spell the end of the gas machine. The extension of electricity and coal gas mains into the outlying territory of the United States made it imperative for the company's executives to invade a new field if it was to prosper.

With the waving of the magic wand of progress, the habits and customs of America changed, and with these altered conditions the status of gasoline took on a new form and transformed it from a source of light to a medium of power.

It was the beginning of the automobile era. Here was a transportation agency that required gasoline for fuel, and as the number of cars increased, the need for a safe, economical and efficient system for handling and distributing gasoline to them became apparent.

The Gilbert & Barker Manufacturing Company had previously constructed storage tanks and small non-measuring gasoline pumps for use with its gas machines, and many of these were pressed into service for filling the tanks of the pioneer motor cars.

As a factor in automotive progress the company assumed the responsibility of anticipating, rather than merely meeting the fuel supply needs of automotive transportation, and its executives promptly contributed many important features of pump design that insure safety, speed and accuracy in delivering gasoline to motorists.

First came the Gilbert & Barker one-gallon self-measuring gasoline pump, in 1908, followed by the five-gallon measuring apparatus, then the ten-gallon visible measuring pump, and, finally the unlimited quantity meter measuring pump that is in such popular favor today.

Research and mechanical skill, coupled with that degree of measurement required by the Bureau of Standards, at Washington, and the Massachusetts Department of Weights and Measures, which demands that a pump must be constructed with a variation of not more than one cubic inch per gallon, or otherwise it will be rejected, enabled the Springfield corporation to place on the market a measuring device which has resulted in its becoming the largest manufacturer in this line in the world, when size of plant, production volume, and yearly sales total are considered.

In 1912, the Gilbert & Barker Manufacturing Company occupied eleven buildings covering eight acres, with 85,000 feet of floor space, and carried 187 employees on its payroll. Today, the plant covers eighteen acres, embraces 500,000 square feet of manufacturing space, and provides employment for 1,600 persons.

The parts entering into one of its attractive pumps are mostly cast in the company's own foundry, in which are poured approximately forty tons of metal each working day.

The next time the reader buys gasoline, he should recall that it is purveyed to his car by a Massachusetts-made product that represents the research, inventive genius, and manufacturing enterprise of Bay State scientists, inventors and artificers, and that from the first primitive pump of a quarter of a century ago, which served fuel to the so-called "horseless carriages" of that era, have been evolved the pumps now installed on every continent and in sixty countries of the world, which serve gasoline to countless millions of motor cars.

During the World war more than 400 Gilbert & Barker gasoline measuring pumps were used by the American Expeditionary Forces, in France —the forerunner of the company's extensive export business, which now

reaches into 108 countries throughout the world. Subsidiary companies for the manufacture of the equipment are located in Australia and Canada, and today the company's equipment is so universally used that you may drive in any part of the wide world where automobiles can travel and buy your gasoline from Gilbert & Barker pumps.

Adoption of the product in such far separated localities and under widely varying conditions has come only through close study and painstaking efforts in meeting the particular needs in each case. Business in a new country means new customs, habits and prejudices to be reckoned with and a new road to be traveled to the goal of approval. When Gilbert & Barker representatives first entered foreign fields they found motorists buying their gasoline from tin cans piled along the sidewalks. It is not easy to break habits and establish new customs, and in the course of bringing about the change, various tests of a more or less spectacular nature were conducted.

Bonfires were built around pumps filled with gasoline and outfits half filled with oil. Open flames were held to broken-off suction pipes, with public officials waiting at safe distance, for the explosion that did not come. Such were the demonstrations employed.

While the American takes his gasoline in United States gallons, the Briton buys his in imperial gallons and the Frenchman buys his in liters. Of course, the equipment must correspond with these requirements, and also with various other rules set up by governing boards and officials in different places. There is an almost endless amount of machinery and red tape involved.

Many interesting incidents arise in the course of this expansion. A little town in South America, where the local band, town dignitaries and most of the populace turned out to watch the filling of an automobile by the first Gilbert & Barker pump paid no less a compliment to the equipment than did a European hospital which appreciated the accurate measuring ability of the equipment to such an extent that it ordered a couple of units furnished in white enamel and nickel for dispensing mineral oil to patients. In one European country steps are built at the insistence of local authorities, on the side of each pump, in order that the customer may climb up and satisfy himself that the quantity of fuel he is purchasing is measured accurately and due amount delivered, the type of installation being such as to suit the purpose of this system of customer inspection.

Production of fueling equipment for airplane fields is a growing factor in the company's operations. Convenience of fueling service and freedom from fire are prime requisites in this regard and the Gilbert & Barker "Aeropit" was designed with an eye to meeting these requirements while being adaptable to all sizes and types of field. This product has been installed on the Pan-American route recently opened for service.

Late in 1929 the corporation began the production of the Gilbert & Barker Domestic Oil Burner after five or six years of test and development work by the company's engineering department.

The burner is of the pressure atomizing type, using combination gas and electric ignition of the most positive form. An unusual feature of its design is an adjustable tip by which the shape and size of the flame can be made to exactly fit the requirements of any heater, whether steam, hot water, or hot air. It is unusually quiet in its operation and entirely automatic, and is equipped with a specially designed radio filter which eliminates any possibility of radio interference.

The Gilbert & Barker Manufacturing Company is a subsidiary of

"Stanco, Inc.," and has capital of $5,000,000. Its home office is in Springfield, but it also maintains offices in New York, Chicago, London and Paris. The officers of the corporation are: C. C. Ramsdell, president; S. C. Hope, vice president, P. H. Bills, treasurer, and Howard Merkel, assistant treasurer.

OUR CONTRIBUTIONS TO AUTO PRODUCTION

How many people in Massachusetts give consideration to the fact that the great producing automobile concerns of the middle West could scarcely carry on their operations were it not for the parts that Bay State manufacturers provide for the trade? There is scarcely a detail in the building of a passenger car or a commercial vehicle that does not have the imprint of Yankee workmanship upon it.

The motor vehicle of today is dependent upon great precision and the vast majority of the finest machines and tools that are employed in vast numbers in the immense factories of Detroit and the other mid-western automobile factories are designed and fabricated in and distributed from gigantic plants in Massachusetts.

Whenever an automobile manufacturer has a problem to solve it is almost universally accepted practice for him to come to the Connecticut Valley, the world center of the machine tool and small tool industries, to conduct his experiments or to secure the machine with which to do his own experimental and research work.

The auto industry is constantly reaching out for new ideas or for improvements in standard practice, and it is to research engineers in Massachusetts institutions of learning and in private industries that it most frequently turns for help. Countless are the new methods and new machines that have been developed here within the past quarter of a century that have proven of incalculable benefit to the automobile manufacturers of the middle West.

There is an ever increasing flow of materials of all sorts from Massachusetts factories to the assembly plants of Michigan, Ohio, and Indiana. In addition to being the home of the highest priced car manufactured in America, Massachusetts sends carloads upon carloads of bodies to the motor car centers, some of the finest custom work employed on the high-class cars being designed and built in the workshops of the Bay State, as well as many standard-type bodies.

Nine out of every ten crank shafts used in American-made automobiles are manufactured in Worcester; 75 per cent of all the auto and motorcycle chains used in this country are produced in the same city, while the local percentage of electric equipment, tires and tubes, camshafts, connecting rods, bearings, kits of auto tools, lamps, curtain fasteners, auto clocks, speedometers, wiring, wire conduits, jacks, windshields, dome lights, lamp sockets, spark plugs, windshield wipers, trunks, luggage carriers, horns, gasoline and oil gauges, ignition devices, timers, dashboard controls, filters, gaskets, fan belts, piston rings, wooden wheels, auto robes, springs, sprockets, batteries, radiators, shock absorbers, rivets, screws, tacks, nails, bolts, runs as high here if not higher than in any other section of the country.

Few autoists realize that the luxurious upholstery material upon which they sit as they ride along our highways, the cushions and backs, the cloth covering and the upholstery, the springs of the cushion, and the vital auto tire fabric entering into the shoes on the wheels are all fabricated in Massachusetts mills. The carpeting covering the floors of many American-

made cars is woven in Massachusetts, while the brake linings and leather upholstery materials are bought here in immense quantities.

THE R. H. SMITH MANUFACTURING COMPANY

In 1865, R. H. Smith founded the R. H. Smith Manufacturing Company, and ten years later acquired the H. M. Smith factory. On January 2, 1884, the concern was incorporated with capital of $20,000, which later was reduced to $15,000. It employs thirty operatives in the manufacture of marking devices, comprising rubber stamps of great variety, stencils for every purpose, steel stamps, numbering machines, sign markers, rubber and rubber-faced type, corporation and other seals, and, in short, business tools essential in every office, factory and mercantile establishment, for the marking, numbering, dating, canceling and perforating of all kinds of materials.

In 1928 the company exported its products to twenty-one foreign countries, and the following year it added much new equipment to its local plant.

Arthur P. Smith is president, Charles E. Toomey, vice president, Harry Jonas, treasurer, and F. A. Wakefield, secretary.

Established in 1866, by Edwin S. Stacy, who invented an upright drill and a pistol of his own design, the Stacy Machine Works have enjoyed a reputation for sixty-four years for the production of high-quality tools.

In the fall of 1898 the concern removed to a new plant, in West Springfield, after having occupied one factory for upwards of forty years. Three sons of the founder—Richard H., Frank E., and Harry W. Stacy, now manage the business.

In 1867, the Hampden Watch Company was formed succeeding the New York Watch Company, and for twenty-two years thereafter was a flourishing concern.

At the outset, the business was small, but the product of the works, while limited, found favor in the markets of the country. The company was first incorporated in 1870 and was reorganized and reincorporated seven years later. The works were maintained in the city until about 1889 and then were removed to Ohio. Many residents of the city still have watches manufactured by the concern, and are proud of the clumsy old timepieces.

THE LOCAL PRODUCTS OF 1868-1869

The Springfield city directory of 1868-1869 showed local manufacturing concerns engaged in the production of artificial limbs, balmoral, beds, beer and soda, blacking, blank books, boilers, brass foundry products, bricks, bridges, buttons, cars, carriages, cartridges, cigars, cards, coffee and spices, coffins, confectionery, corks, corsets, cotton batting, drain pipe, eave troughs, enameled paper and cardboard, envelopes, firearms, gas burners, gas, gold leaf, gold chains, gold pens, harness, saddles and trucks, hoop skirts, iron castings, machine shop products, paint and chemicals, watches, paper bags, paper boxes, paper collars, printing, rubber, sash and blinds, saws, shirts and collars, sieves, silver plate, skates, slippers, soap and candles, spectacles, spirit levels, tinware, tools, wagons, washing machines and woolens.

In 1870 Springfield had a population of 26,703, or more than double the figures of 1852, when it adopted the city form of government.

Although it suffered severely during the hard times, which came in 1873, there was no serious setback in its industrial progress.

THE SPRINGFIELD FOUNDRY COMPANY

In 1870, the Springfield Foundry Company was established, but was not incorporated until October 9, 1877, when its capital was fixed at $100,000.

Under the management of the Messrs. Hale, this sixty-years-old concern has become one of the most important foundries in western Massachusetts. Its modern buildings contain approximately 60,000 square feet of floor space and are composed of concrete and steel. The company generates its own steam-electric power and its property includes eleven acres of land adjacent to the Boston & Albany railroad tracks, with two private sidings, one for incoming and the other for outgoing freight, as well as a shipping platform of sufficient length to accommodate six railroad cars at once.

In 1928 it installed a sand blast room and a new sand blast tumbling barrel of the most improved type, thus adding to the efficiency of an establishment that has been developed in recent years.

While the foundry is equipped to produce castings ranging from 10,000 pounds downward, it has come to specialize more and more in light high-grade castings in multiple, and for this line of work the new tumbling equipment is of distinct advantage in promoting a rapid dispatch of operations.

Castings are made extensively for railroad, automotive and a wide variety of industrial uses and parts for machine tools, lawn mowers, steam pumps and gas engines are produced on a quantity basis. A general jobbing business is done by the concern in its line, which consists of gray iron castings exclusively.

The company employs upwards of 100 men, and David Hale is president, Clarence W. Hale, vice president and James D. Hale, secretary and treasurer.

In 1870, J. F. Peck began the manufacture of spring beds, carrying on production in his individual name until June 18, 1889, when he incorporated The United States Spring Bed Company, with $10,000 capital, since increased to $50,000.

R. W. Ellis is president, and George S. Sabin, treasurer, of the concern, which has added mattresses to the line of spring beds, and fifty workers are employed.

The Springfield Paper Company was incorporated in 1870, and twelve years later was reincorporated.

THE DUCKWORTH CHAIN & MANUFACTURING COMPANY

In 1871, the Duckworth Chain & Manufacturing Company was established, and became incorporated in 1900, with capital of $15,000.

It began operations in a modest way in the heyday of the bicycle craze, but since the advent of the automobile and the motorcycle it has grown by leaps and bounds, and its importance in the field of chain manufacture is recognized by automobile, bicycle, motorcycle and machinery manufacturers. It makes a specialty of designing complete chain drives for individual requirements, and in 1929 found it necessary to make a material plant extension, when it acquired from the Bozart Realty Trust a large building, in the Brightwood district, and erected a new two-story fireproof structure, for its heat-treating department, this addition to the main building matching the latter in architectural appearance. It contains 16,000 square feet of space, and brought the entire floor area of the Brightwood unit to

80,000 square feet. At present the bulk of the manufacturing is being carried on at the Company's plant, in the south end of Springfield, and most of the assembling is done at Brightwood.

Two hundred hands are employed, G. H. Empsall is president, and J. W. Harris treasurer of the concern, which now operates as a voluntary trust.

In October, 1873, the National Needle Company was established, beginning operations with six men, and later employing 110. In 1879 the concern made 6,000,000 needles, and ultimately became the largest producer of its kind in the world.

THE CHAPMAN VALVE MANUFACTURING COMPANY

In a little more than a half century, the Chapman Valve Manufacturing Company has grown to be the largest plant in the world devoted exclusively to the manufacture of gate valves and it stands today as not only a dominating industry of the city, but as the world's leader in its chosen field.

Its chief products are iron, brass and steel valves, sluice gates and hydrants, floor stands for use in mills, power plants, oil refineries, and water works projects.

At the time of its transfer from Boston to this city, in 1874, the Chapman company was a comparatively young firm, having been established only four years before, and it was then operating under patents granted to the inventor of the first valves, John A. Chapman.

The company was incorporated July 20, 1874, with capital of $60,000, and construction of the Indian Orchard shops began that year, but it was not until 1876 that actual production was under way. The first buildings consisted of a three-story brick structure, used as a machine shop and a single-story building of brick, where the casting was done. Both structures comprised only about half an acre and seventy employees made up the working force with a weekly payroll of from $900 to $1,000. Today, the plant includes 9.72 acres, of manufacturing space, and 1,200 hands are employed, with a weekly payroll exceeding $40,000.

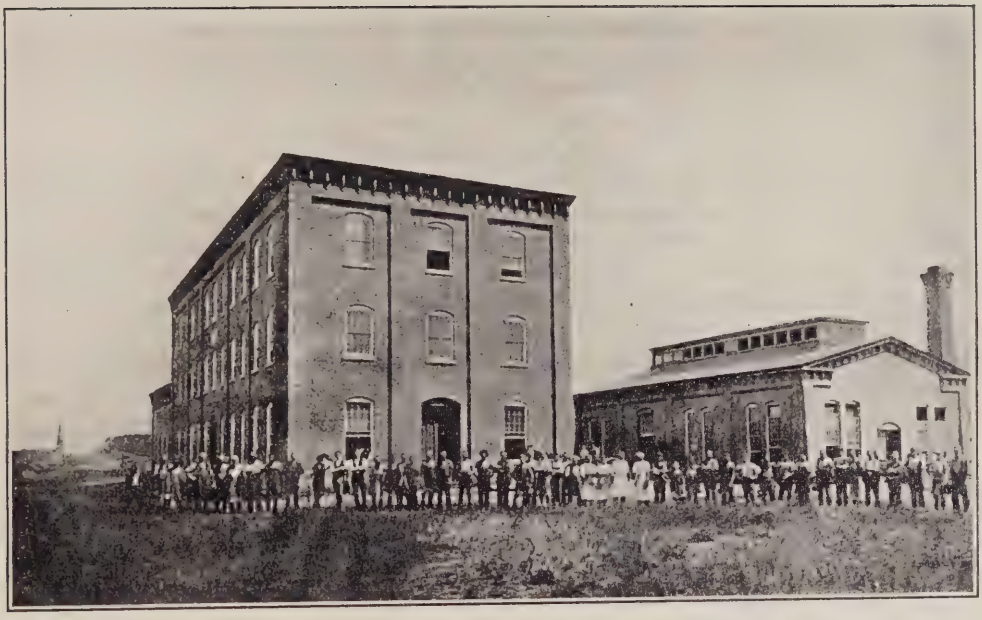
The years 1886 and 1887, found the operating force increased to about 150 men. During a financial depression in the former year and a disastrous fire in the textile mills located at Indian Orchard, the firm held its position for five years, being practically the only operating industry in that district.

In 1909, a complete reorganization took place and the present management came into being. Adolph W. Gilbert of Hartford, Conn., was elected president and general manager. When these changes had been completed it was deemed advisable by the stockholders to form a new company, which was incorporated May 9, 1911, the name of the old unit being retained.

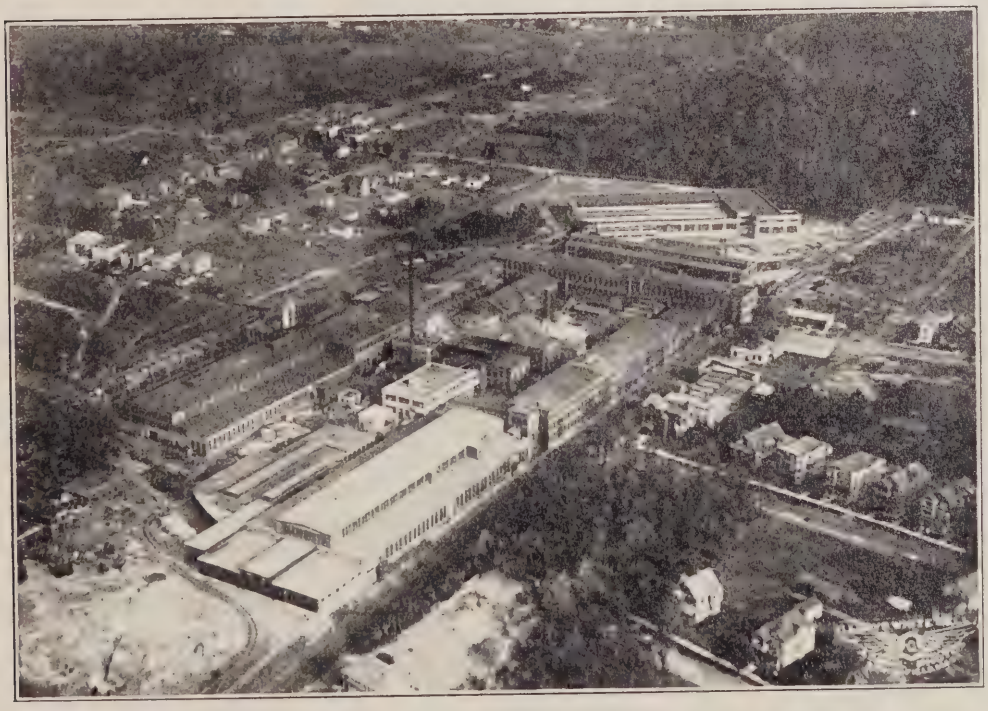
Since 1924, two more structures have been erected,—a service building to house the central organizations of the various departments and a steel machine shop for the machining of steel valves. This latter building alone employs 150 men, comprises 42,000 square feet of floor space, and cost $500,000.

Valves are manufactured for air, gas, water, steam and even molasses. The company also supplies water works material to such great cities as New York, Chicago, Philadelphia, Milwaukee and St. Louis, as well as to other large municipalities throughout the United States.

To the metallurgical research development work in the laboratories of



ORIGINAL CHAPMAN VALVE MANUFACTURING COMPANY'S FACTORY, 1874



AERIAL VIEW OF THE PRESENT PLANT OF THE CHAPMAN VALVE MANUFACTURING COMPANY, INDIAN ORCHARD

the company of world-wide importance in its application to various industries has been due in a great measure the phenomenal growth of the concern in recent years. First notably employed in the production of a cast alloy steel for valves and fittings subjected to high pressures and high temperatures, this work has been extended to include the manufacture of various metal alloys for industrial use, employed in both cast and wrought forms, and has included studies of the endurance of metals under high temperatures during short and long periods, the use of the X-ray in tests and investigation of defects of metal, a study of the control of sand as a factor in making molds and cores, and many other phases of production.

The manufacture of metals to withstand extremely high temperatures and high pressures has been of enormous value in steam power plants and oil refineries. A few years ago pressures exceeding 250 pounds to the square inch and temperatures of more than 500 degrees Fahrenheit were unknown in industrial practice. Now the pressures employed run as high as 600 pounds to the square inch and 1,000 degrees Fahrenheit in certain cases.

At the Chapman Valve plant a cast steel was produced for valves having the hard tough qualities suited to the resistance of fatigue, shock and erosion. Then came the production of metal alloys, both cast and wrought, for the seatings, linings and trim of valves, similarly capable of withstanding the same tests. An outstanding example is the so-called Davis metal, a nickel copper alloy widely used in steam power plants. By the use of a chrome nickel steel it has been possible to attain a temperature of 1,050 degrees and a correspondingly high pressure in "cracking" gasoline, thus enabling a greater proportion of gasoline to be derived from a given amount of oil.

Other research work looks to the increase of temperatures to 1,000 degrees Fahrenheit in power plant work as well as in oil refineries. This is against a present maximum of 750 degrees. If this proves successful, as seems probable, it will mean a big gain in efficiency of operation.

Among the most recent developments at the plant have been the devising of a process for rolling and forging the Davis metal, producing one of the strongest metal alloy compositions known and having a very broad industrial application; the employment of heat treatment to produce the maximum corrosion resistance and erosion resistance of metals; the improved heat treatment of stainless iron, resulting in the manufacture of a new low-carbon stainless metal for valve trimmings; the improvement of steel castings through the attaining of higher standards in determining the quality and condition of the sand used in the molds and cores, and the development of an alloy steel for the manufacture of bolts subjected to high temperatures and pressures. The last-named supplied a much-needed item in the direction of complete efficiency along the lines described.

The matter of the sand used for molds, while incidental, is none the less important. By the sand-testing laboratory installed it is possible to measure the moisture in the sand and make necessary corrections; to determine the resistance to gases and establish the correct permeability to allow the desired escape of gases during the casting operation; to secure the proper strength of sand so that the molds will be sufficiently strong to withstand the pressure of the hot metal without breaking, and to control the refractoriness and durability of the sand, so as to enable it to withstand the heat without forming a slag that might enter into the steel. The need of this line of research, as of various others, was emphasized as a result of X-ray tests made in the laboratory.

The influence of such research work on the development of central power station efficiency is of far-reaching value in existing circumstances.

The metallurgical laboratory of the Chapman Valve Manufacturing Company was started in 1921 for the control of shop and foundry practice and soon developed into a research laboratory extending its studies into various problems affecting interests served by the concern. As now constituted, there are three distinct laboratories. A routine chemical laboratory looks after matters pertaining to shop practice such as the analysis of incoming materials; the metalographic and physical laboratory, which makes physical tests of materials to see if they are up to the standard and watches the heat treatment of materials, tools and products, and the main research laboratory, devoted to furtherance of development projects.

This research laboratory operates twenty-four hours a day with twelve employees working in three shifts. It has its own machine shop for making tests and producing instruments, for its use, many of which are of new design.

This laboratory is one of the largest in the East, devoted to the metal industries. Its use of the X-ray as applied to steel castings, its development of sand control, its experiments in corrosion-resistance and its work in perfecting steel alloys requisite for specific tasks—these represent original investigation, the fruits of which are being applied over a wide field.

Through the great engineering societies of the country the Chapman Valve Company has been an active and constructive factor in investigations and discussion of present-day problems. By its representation on committees constituted for the revision and improvement of engineering standards, for better knowledge of problems of heat treating and for more exact information respecting the uses of iron and non-ferrous metals in the new alloys, the company has exerted a strong educational influence.

In its more direct relations with the oil, steam power and other industries it has furnished the equipment and the engineering data enabling concerns to increase their efficiency and raise the volume of production. Its stainless steel is said to have solved the problem of a satisfactory material for the seating of valves, getting more use from the valves than before and so increasing the efficiency of refineries. The role exerted by its high-pressure steel in increasing the gasoline supply is of such obvious widespread application as to need no emphasis. Work done in the interest of steam power plants promises to be of equal or greater import in view of the general effort now being applied to increase the sum total of available power and its more efficient utilization. In 1929 attention was focused upon the new chromium steel alloy, known as nit-alloy.

This metal undergoes a process of heat-treating known as nitraiding, by which the action of ammonia gas at low temperature gives the surface an extreme hardness and wear-resistance said to be approached by no other steel. The process, protected by patents, is said to increase the life of valves a hundred-fold in some instances, and the metal is employed for various other uses where friction and erosion are encountered in an exceptional degree. On account of its superior forging, machining and wearing qualities, this steel is considered an important addition to the family of rustless metals. It is said to be fully as resistant as stainless steel to the corrosive action of fresh or salt water or moist atmosphere, and ranks next to stainless steel in resistance to hydrogen sulphide gas.

In respect to personal direction, social and recreational activities and safety work the corporation ranks with the foremost in the Connecticut Valley. In point of continuous, sustained operation on a full-time basis,

month by month and year by year, it is in a class with the most fortunate, and for a long time the plant has been running at full capacity, with building expansion undertaken as the sole means of enabling the concern to fill its orders and meet the increased demands that come as the recognition of its success.

The corporation has capital of $3,000,000, the increase from $1,500,000 to that amount having been made in 1928, when two-thirds of the new issue were distributed to stock-holders in the form of a stock dividend. In its last recorded fiscal year the company increased its surplus from $1,635,-199 to $1,808,279.

Adolph W. Gilbert is president, and John J. Duggan, treasurer. Dr. E. C. Gilbert has borne the managerial responsibilities during the past five years or more. The concern employs 1,250 operatives.

THE BULLOCK MANUFACTURING ASSOCIATES

In 1875 Orvis W. Bullock, of Milton, Vt., visited an uncle in Springfield, and called upon his brother, Horace W., then in business with B. C. English, producing cartridges and brush gun-cleaners, Messrs. Bullock and English having carried on this type of production from about 1860. The latter was desirous of retiring and the two brothers formed the firm of H. W. and O. W. Bullock. It was the day of the key-winding watch, and the Bullocks added various styles of watch-keys to their products, and hired two men to assist the members of the firm. In 1876 Orvis W. Bullock purchased his brother's interests, and added tweezers, and some printers' and jewelers' tools to the line of goods. By 1880 nearly one hundred items were listed and five years later the total had risen to two hundred.

Mr. Bullock remained active until his death, in 1904, when Walter B. Fish became president of the concern and served until he died, in 1921. W. O. Day was then chosen president, and C. C. Meredith treasurer. In 1924, Hoyt E. Battey, a grand-nephew of O. W. Bullock purchased the business, which has been carried on for so many years under the name of the Bullock Manufacturing Associates, and he is president and treasurer.

The corporation has capital of $100,000 and employs fifty operatives in the production of high-grade small tools, having recently added a line of orchard and nursery men's pruning shears to its commodities, which include saw sets, revolving punches, soldering irons, small vises and jewelers' and printers' tools. In 1929, production and sales were 35 per cent ahead of the previous year.

SOME INDUSTRIES ESTABLISHED IN THE SEVENTIES

In 1876 the Phillips Manufacturing Company was established to produce steam heating apparatus.

The next year, the Bemis Car Box Company, was formed, and became incorporated in 1885, with capital of $300,000. Subsequently it became the Bemis Car Truck Company, and as such it operates today, with capital of $150,000, and employs fifty hands in the manufacture of electric railway supplies. Warren K. Boyer is president and treasurer and Joseph A. Lammon, secretary.

For a quarter of a century Nathan D. Bill was actively engaged in promoting Springfield enterprises, starting as a clerk, in 1873, with the Powers Paper Company, and becoming part owner and later sole proprietor of the Union Envelope & Paper Company, in 1875. Two years later this concern was consolidated, with the P. P. Kellogg and George A. Russell units,

into the National Papeterie Company, with which concern Mr. Bill was connected for eleven years. The National Papeterie Company, was incorporated January 15, 1889, with capital of $100,000.

In 1887, Mr. Bill organized the Springfield Envelope Company, and in 1892 he formed the National Envelope Company. The same year he started the Springfield Knitting Company, and later became president of the Windsor Paper Company, and the Platner & Porter Paper Company.

Founded in 1878 by Francis K. Williams the F. K. Williams Company, originally doing a general printing business, subsequently developed die-cutting, and later the designing, printing and manufacture of grinding wheel labels in the nature of a compression pad that absorbed shocks, and was cut to precision.

In 1878 the American Papeterie Company was formed, and placed upon the market the first fancy stationery in fancy boxes ever introduced into the trade; and on July 23, 1878, the Springfield Weaving Company was formed.

THE BLAIR MANUFACTURING COMPANY—KNOWN WHEREVER GRASS GROWS

One of the first lawn mowers manufactured in the United States was called the "Easy," and was brought out in 1879 by the firm of Blair & Fiske, which started with capital of $25,000, now known as the Blair Manufacturing Company. It was the invention of Mr. Fiske, who, in order to obtain capital, associated himself with Mr. Blair under the firm name of Blair & Fiske and began the manufacture of lawn mowers on Taylor Street. A few years later W. A. Loud and A. B. Case invented what either was the original or one of the first side wheel lawn mowers of the type in extensive use today, and which was called the Bay-State Hercules. Both were connected with the firm of Blair & Fiske, which began the manufacture of the new mower. In 1892, Messrs. Case and Loud acquired ownership of the concern, and in 1902 Mr. Case became the exclusive owner and changed the name to the Blair Manufacturing Company.

Although it has undergone numerous modifications and improvements in design, the Hercules is the leading product of the company today. It is believed to be the first hand operated mower to be equipped with steel wheel shafts and roller bearing wheels. The Easy, although it now forms a very small part of the company's output, is still sold in this country and abroad.

The Blair Manufacturing Company ships it products to France, England, Italy, Ireland, Canada, Bermuda, New Zealand, Germany, Switzerland, Mexico, Spain, Portugal, Sweden, Norway, Australia, India, Egypt, Holland, Denmark and Poland.

Volume production has increased about 30 per cent in this plant in the last three years. A new steel warehouse was erected, in 1928, and plant equipment was improved by the addition of new grinding machines and punch presses, that year.

In 1929, in order to take care of its orders, the company began the occupancy of the second floor of the old Russell Construction Company's building, directly adjacent to its main plant, and erected a steel bridge to connect the two units. This addition increased the amount of manufacturing floor space by about one-third.

The corporation closed its 1929 season with an increase of more than twenty per cent in volume over the previous year.

An analysis of the company's sales in 1929 indicated that while the

market is highly competitive and calls for a large production of the popular-price types of lawn mowers, there is a distinct demand for a product in which quality and labor-saving improvements are rated above price considerations. The local concern has made it a feature of its policy, to keep out of the very cheap class of production that relies upon a low price as the governing consideration in making sales. As evidence of the demand for products in which improved operation and durability appear as inducements to the purchaser, a new lightweight mower, with ball bearings of a special type and a new machine having stationary underknives of Sheffield steel, are said to have made a good showing in the 1929 output.

More than ever before the production of the concern has been established on a continuous, all-the-year-round basis, with its former seasonal character largely eliminated. This system offers notable advantages, especially in dealing with the labor problem.

Phillips N. Case is president and treasurer of the corporation, which employs fifty hands.

THE HOLYOKE CARD & PAPER COMPANY

In 1879, the Holyoke Glazed Paper Company was organized in Holyoke to manufacture glazed and plated papers, and following a loss of its plant by fire, it located in Brightwood. In 1884, the concern was incorporated as the Holyoke Card & Paper Company, with capital of $60,000 which later was increased to $150,000. Cardboard, surface coated, fancy cover and fancy box papers, photograph mounts, and glazed and plated papers, constitute the products of today. The company occupies a modern plant, consisting of two main buildings 225 by 55 feet, three stories high, with basement, and has capital of $300,000.

A strong believer in progressiveness, it is continually developing new lines to meet changing conditions, and its products are sold nationally and in many foreign countries.

Upwards of 100 hands are employed, G. Frank Merriam is president, Arthur L. Janes, secretary, John B. Van Horn, treasurer, and Arthur Beston, assistant treasurer.

On February 6, 1880, the Dickinson Hard Rubber Company was incorporated, with capital of $40,000, and on November 10th of the same year, the Fisk Manufacturing Company was incorporated, with $50,000 capital, to manufacture soaps.

The Springfield Steam Power Company, with capital of $200,000, was incorporated on March 28, 1881, and the same year the Medlicott-Morgan Company was established to engage in the manufacture of fine fancy cotton underwear, and for years was Springfield's only cotton knitting plant.

On April 7, 1882, the Springfield Envelope Company was incorporated, and the Springfield Knitting Company was founded the same year, becoming incorporated on May 6, 1892.

THE BAUSH MACHINE TOOL COMPANY

The Baush & Harris Machine Tool Company, now known as the Baush Machine Tool Company, was established, in 1880, but it was not incorporated until April 4, 1896, when the capitalization was fixed at $75,000.

Its progress in the intervening years is another indication of what can be accomplished when a metal-working industry is located in a locality where there is an abundance of skilled artisans, such as has characterized the Connecticut Valley since the Government Armory was established more than 135 years ago.

Today, 300 men are employed in the manufacture of high-quality machine tools, worm gears, universal joints, and aluminum alloys, and, in addition to the machine tool division, located in Springfield, the corporation operates its metals division, in a separate plant, in Chicopee. It now has capital of $1,847,792, or almost twenty-five times what it possessed less than thirty-five years ago.

George D. Haskell is president, Caleb Loring, clerk, Roger D. Babson, vice president, and Robert W. Daniels, treasurer.

THE PHELPS PUBLISHING COMPANY

Organized in November, 1880, by Edward Phelps, S. A. Bemis, J. D. Safford, and Emerson Gaylord, with capital stock of $12,000, the Phelps Publishing Company has grown in fifty years to a corporation, now utilizing capital of $1,000,000—more proof that Massachusetts industries are growing, rather than declining.

The pioneers acquired the *New England* and *New York Homestead* and the *Farm and Home* magazines, and in May, 1881, the corporation invested largely in the Orange Judd Company, of New York. In August, 1894, the Phelps concern sold its *New England* and *New York Homestead,* to the Judd company, and in June, 1897, the Phelps Publishing Company acquired the *Springfield Homestead,* a local high-grade journal, disposing of it in September, 1901, to the Springfield Homestead Newspaper Company.

The year before the Phelps company bought the women's magazine, known as *Good Housekeeping,* when its circulation was about 5,000 copies monthly, and under the new ownership as well as that of the Good Housekeeping Company, a subsidiary corporation formed by the Phelps concern, its growth in circulation and influence was little short of amazing. When, in 1911, the magazine was sold to William Randolph Hearst, it had upwards of 300,000 subscribers.

In January, 1907, the Phelps plant was completely destroyed by fire, but the corporation promptly erected a modern fire-proof reenforced concrete structure, containing over seven acres of floor space, and costing upwards of $1,000,000.

In March, 1921, the *New England Homestead* was again acquired by the Phelps Publishing Company, and in June, 1925, the national monthly magazine, *Farm & Home,* was sold to the Farm Life Publishing Company, of Indiana. Since that date efforts have been focused on further improvements and circulation of the weekly *New England Homestead,* and upon the printing and manufacturing business. At the present the Phelps Publishing Company, in addition to owning and publishing the *New England Homestead* is also manufacturing twenty odd weekly and monthly journals and magazines, including the *Outlook* and *Independent.*

Following the death of President Herbert Myrick in July, 1927, the owner of the controlling interest in the corporation, a group of nine executives within the organization bought the control in the name of the Phelps Associates.

Glenn C. Sevey is president, James A. Falconer, treasurer, Helen Sampson, secretary, Warren A. Priest, advertising manager and Alfred W. Thorn plant manager. Upwards of 150 operatives are employed at the plant.

The Taylor & Tapley Manufacturing Company was incorporated on January 1, 1884.

On March 24, 1884, the Springfield Waste Company was incorporated,

with capital of $150,000, and still carries on the manufacture of cotton and wool waste, twenty-five hands being employed.

E. B. Bennett is president, A. H. Watson, secretary, and George E. Howard, treasurer.

The Standard Brick Company was formed on April 17, 1884, with capital of $5,000, and on March 30, 1885, the Atlas Pulp Company was established. The United States Compound Oxygen Company was incorporated January 19, 1886, and on the nineteenth of the following March, the United States Envelope Machine Company was formed.

In 1887, the Aerated Fuel Company came into being.

THE UNITED ELECTRIC LIGHT COMPANY

A community would be poor indeed were it not served by a progressive power company in these days of mass production. On May 9, 1887, the United Electric Light Company, of Springfield, was incorporated, with capital of $500,000.

The great growth of this public utility has taken place under the administration of Walter L. Mulligan who entered its employ, in 1897, upon his graduation from Cornell University. Starting as an electrician, he was promoted to assistant manager and later to manager, and became treasurer in 1920 which position he still holds.

Power being one of the primary factors in industry it is interesting to observe that during the year 1927 the output of the United Electric Light Company increased about 2,000,000 kilowatt hours, to 81,693,982, the highest in its history. The 1926 figure was 79,753,000. The revenue for 1927, during which a cut in lighting rates was made was $3,312,153 as compared with about $3,250,000 in 1926. In January, 1927, a 25 per cent dividend was split among all customers in the form of a reduction on bills of that month.

Pessimistic officials never seek to make additional investments in extensions, and it is noticeable that the officers of the United Electric Light Company are not in that class as during 1927 alone they undertook new construction, which was not finished until late in the spring of 1928, including a new high-tension substation in West Springfield which cost approximately $750,000, hydro-electric power development, at Indian Orchard, which doubled the capacity of the No. 2 station there and which cost $260,000 and an addition to the main office building at a cost of $175,000.

The company has capital of $4,000,000, and employs 300 operatives. Walter L. Mulligan is president, and F. C. Abercrombie, treasurer.

THE HAMPDEN GRINDING WHEEL COMPANY

The Hampden Corundum Wheel Company removed to Springfield, from Chester, in 1888, and was incorporated that year, with capital of $16,000. Later the name was changed to Hampden Grinding Wheel Company, and as such it carries on the manufacture of chamois and grinding wheels, its capital today being $300,000. Upwards of 100 hands are employed. H. G. Deane is president, F. S. Hatch, secretary, and G. S. Emerson, treasurer.

In 1889 the Mander Electric Works Company was incorporated, with capital of $200,000.

On April 1, 1890, the Springfield Brass Company was incorporated, with capital of $25,000, and seven days later the Springfield Narrow Fabric Company received its charter.

In July, 1890, the Metallic Drawing Roll Company was incorporated, with capital of $80,000, since reduced to $40,000, and is engaged in the manufacture of steel rolls for textile mills, fifty operatives being employed.

R. F. Herrick, Jr., is president, R. A. Ostburg, vice president and general manager, C. E. Cooke, secretary, and R. P. Snelling, treasurer.

The Bay State Corset Company, which was established in West Brookfield, in 1884, as C. C. Olmstead & Co., removed to Springfield, and was incorporated on July 19, 1890, with capital of $100,000.

Now known as the Olmstead Corporation, it employs upwards of 200 operatives in the manufacture of corsets. O. B. Olmstead is president, and W. L. Gladding, treasurer.

In 1928 it opened a New York office, thus reviving a custom that was prevalent among corset manufacturers for many years, and one that is being adopted as a convenient means of dealing with buyers of chain stores. Now that the "debutante slouch" has passed out and distinctly feminine figures have superseded the boyish craze of a few years ago, calls for corset garments are much in demand.

THE VAN NORMAN MACHINE TOOL COMPANY

The Waltham Watch Tool Company, which later became the Van Norman Machine Tool Company, a more enduring and successful enterprise than any of its predecessors in Springfield, was not the outgrowth of any previous establishment of the same class. It came to Springfield by removal from Waltham, in 1890, in which year also the company was incorporated. Many of the city's skilled workmen learned their trades as tool-makers in the old Waltham shops. The company became the Van Norman Machine Tool Company and was incorporated under that name May 7, 1912.

In placing on a production basis its new machine for grinding ball bearings the Van Norman Company took a distinct forward step in the development of its business. This device is employed in grinding various curved surfaces, so that while the ball bearing use constitutes its major application thus far, its utility is by no means restricted to that field.

Along with this promising factor the company has continued the production of milling machines of various sizes and its automotive service machinery, which is being extended every year to keep pace with the requirements of service and repair shops.

It has capital of $500,000, employs upwards of 300 skilled men, and manufactures high quality machine tools. C. E. Van Norman is president, F. D. Van Norman, vice president, and Frank H. Page, treasurer.

THE BAY STATE ELEVATOR COMPANY

Elevators have been manufactured in Massachusetts for many years and since production started in that line Springfield has been indentified with the industry. Back in the early nineties, electric elevators were being built and developed in the city by the Elektron Manufacturing Company, which was formed in 1888, with capital of $200,000, while hydraulic elevators were being produced at that period by the Springfield Elevator & Pump Company. Eventually, these companies were absorbed by other industries. Today, the Bay State Elevator Company is constructing and installing freight and passenger elevators of both types and the product is widely distributed throughout the east, offices of the concern being maintained in Boston, Hartford, Worcester, Pittsfield, and many other cities.

The company's plant facilities are such as to enable it to turn out either

hydraulic or electric elevators, having capacities from 100 pounds to twenty tons, and it also manufactures dumb-waiter equipment operated by hand power, and electric driven screw lifts, either in single or multiple units. Among its customers are many of the railroads, and large industrial establishments.

In 1908 a new and modern plant was built, where the company produces today a complete line of moderate speed freight and passenger elevators of the hand-power, plunger-hydraulic and direct-electric types, with various control arrangements, ranging from the ordinary cable to the more convenient push button control, with special levelling features. The company also builds special lifts for all purposes including furnace, factory, and various types of theatre lifts.

It is incorporated under the laws of Massachusetts, with a capital of $150,000, and the officers are: C. E. Ketchum, president, W. J. Taylor, vice president, D. D. Judd, secretary; W. C. Arnold, treasurer.

The organization is made up of experienced elevator engineers and mechanics who have devoted their lives to the elevator industry. An interesting phase of the business is the fact that about 70 per cent of the company's sales each year are repeat orders from satisfied customers.

On October 31, 1890, the C. W. Mutell Manufacturing Company was incorporated and on March 30th, the P. P. Emory Manufacturing Company was established, with capital of $30,000.

The George A. Schastey Company was incorporated in April, 1891, with $12,000 capital, and on August 12th, the Springfield Door, Sash & Blind Company was formed.

W. F. YOUNG, INC.

In 1891, W. F. Young, then operating a music store, in Meriden, Conn., as well as a stable of stylish driving horses, created a formula for a horse liniment, which he commercialized, and six years later removed his laboratory to Springfield, where he began the production of Absorbine, on a large scale. He next created a remedy to serve the human family, which was marketed under the name of Absorbine, Jr., and the preparation of these two products now requires all of the area in a large four-story building. For ten years or more the concern operated as W. F. Young, Inc., has maintained a branch plant in Montreal, and it exports its products to Great Britain, Continental Europe, the Far East, Australia, New Zealand, Cuba and Central and South America. Following the death of the founder, his son, W. F. Young, Jr., was elected president of the corporation and served until 1928, when he died.

The present officers are president, Mrs. M. Ida Young Alexander; vice president, Charles T. Richardson; treasurer and general manager, H. H. Caswell. The company has capital of $500,000.

THE BLAKE MANUFACTURING COMPANY

On February 10, 1892, the Blake Manufacturing Company was incorporated, with capital of $15,000, being founded by William E. Blake and others, who were connected with the National Papeterie Company. At the outset the product was brass fasteners for paper boxes, but gradually the lines were extended, and on September 12, 1923, James L. Shannon, for many years treasurer of the Bay State Elevator Company, acquired 75 per cent of the stock in the concern from the George A. Russell estate and the following year he purchased the rest of the stock.

In 1925 the business was moved to the old Victor Saw Company's plant

in Brightwood, where it has approximately 50,000 feet of floor space and 121,000 feet of land, with railroad facilities. In 1928 a two-story brick addition, 140 by 80 feet, was erected, and much of the time that year the concern operated evenings. At the new site the factory equipment has gradually been improved to meet requirements for the production of innumerable small items along with the main lines.

Today, the company's principal products are flashlights, which are sold by it on every continent in the world. Between 7,000 and 8,000 are turned out each working day, some having a range of 1,500 feet. A marked increase of export sales is reported, along with an enlarged volume of output for American use and from 1926 to 1929 the production increase was forty per cent.

Upward of 100 varieties and sizes of hand flashlights are manufactured for widely diverse uses, the range of production is constantly being widened, and improvements have been introduced. Among the recent new departures is the equipping of flashlights with a lock switch to prevent the battery from being exhausted when the light is not in use.

Some of the innovations look to improved efficiency; others are designed to make the products more attractive. Fancy ornamental cases are made of various kinds of material, some of them with gold-plated fittings. In the boudoir line, especially, ornate and dainty effects predominate.

Besides the flashlights marketed by the company in its own name, the concern turns out this product for several large jobbers who sell under their own trade marks. Along with its flashlight business, the company manufactures all kinds of brass and steel stampings and within the last two years it has developed a line of small electrical parts, such as switches and switch-plates for the building trade. It is also supplying parts of door locks for a famous popular car in large quantities.

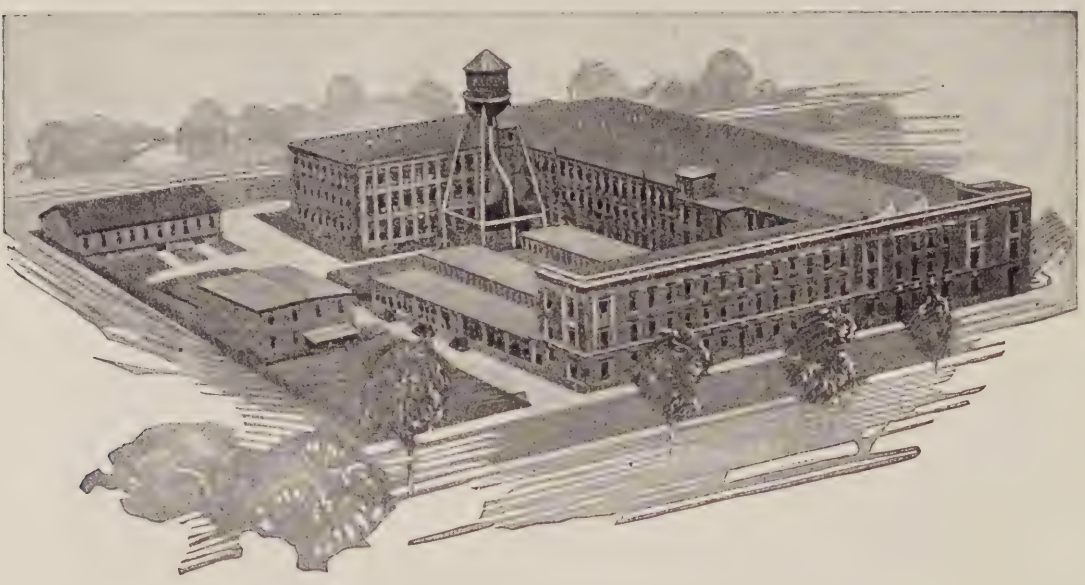
Two hundred and fifty hands are employed, James L. Shannon is president and treasurer, and M. C. Shannon secretary.

THE NATIONAL EQUIPMENT COMPANY

Thirty-five years ago who would have had the temerity to prophesy that in Springfield there would be originated, invented and produced, between 1893 and 1930, equipment which today plays a dominant part in the development of the confectionery industry of America. From a small, one-floor affair the plant of the National Equipment Company has grown until it is now the largest of its kind in the world—producing nearly 100 different machines for making chocolates and all kinds of candy, and during all these years, with high ideals and vision, it has kept abreast of the needs of one of Massachusetts' leading industries by producing labor-saving and time-economizing machinery to meet every demand of volume production in the great confectionery trade.

Frank H. Page, a graduate of Massachusetts Institute of Technology, went to Minneapolis, in 1886, where he founded the Northwestern Knitting Company, now the Munsing Wear Company, and in 1892 he organized the Confectionery Machinery Company, of Minneapolis, removing the business to Springfield, two years later, the corporate name of the concern being changed to the National Equipment Company, in 1912. The concern has capital of $2,000,000 and employs 300 hands.

Under the administration of Sales Manager George A. Bausman the company has progressed with truly amazing rapidity, and the Bausman disc process for grinding and refining chocolate, together with the Mogul



NATIONAL EQUIPMENT COMPANY, SPRINGFIELD

machine, for casting candy centers; the Enrober, for coating candy and biscuits, and the continuous cooker, for cooking hard candy, have made its products known to confectioners and food producers throughout the world. The concern also builds the Kobert electric riveting and prying machines. Frank H. Page is president, C. A. Crocker and A. L. Bausman, vice presidents, and George S. Sabin, clerk.

THE CHANDLER COMPANY

In 1893 Louis J. Chandler engaged in the manufacture of name plates and stamped metal goods, later adding etching to the line. In 1908 he purchased a New York concern, which he removed to Springfield and consolidated it with the Chandler Company, and now employs fifty hands. The export market of the products extends to Australia.

Mr. Chandler is president and treasurer of the corporation, which has capital of $60,000, and A. F. Bassett is secretary and assistant treasurer.

The Springfield Drop Forging Company was founded in 1892, and was incorporated on May 18th of the following year, with capital of $100,000.

The Birnie Paper Company was established in 1892, and located its plant in the Brightwood district, where it engaged in the manufacture of correspondence stationery, and employed 100 operatives.

In 1892 Amos G. Cross established the Century Manufacturing Company, with a capital of $1,500, and made sales of clothing of special types amounting to $20,000 the first year. In 1910 the firm became known as A. G. Cross & Son, when Frederick B. Cross, son of the founder, became a partner. The butchers', grocers', waiters', physicians' and dentists' clothing, duck and khaki trousers, and automobile clothing turned out by the concern, is marketed from Maine to Seattle, Washington, and the sales of the firm, in 1928, were $116,000.

The J. H. Rogers Carriage Company was incorporated in 1893, with capital of $40,000, and on February 10th, the same year, the Standard Button Company was incorporated, with capital of $4,000. The Springfield Coil Boiler Company received its charter on July 12, 1893.

THE HODGES CARPET COMPANY, INC

One of Springfield's leading concerns was born in 1893, when the Hodges Fibre Carpet Company was formed, with capital of $90,000.

Known as the Hodges Carpet Company, Inc., since it was incorporated in 1895, it employs 700 operatives in the manufacture of seamed and seamless axminster rugs, fibre and wool, and fibre rugs, paper twines and yarns, at its Indian Orchard plant, operates a branch unit in Northampton, has its main office at 295 Fifth Avenue, New York City, and is capitalized for $1,000,000. The Indian Orchard plant is equipped with 300 looms, and 300 jute spindles.

E. A. Carter is president, Victor G. Benttell, treasurer, Harry G. Fisk, vice president, and C. W. Walker, secretary.

FRED T. LEY & CO., INC.

Few Springfield concerns are known more intimately in international circles than Fred T. Ley & Co., Incorporated, which was formed, in 1893, to engage in general contracting, and which now maintains offices in Springfield, Boston, New York and Jacksonville, Fla. It was incorporated in 1901.

Since 1919 a subsidiary concern, Fred T. Ley & Co., Ltd., has had an office in Lima, Peru, where it has carried on extensive construction and improvements for the Roman Catholic archbishopric, while having the administration of the church properties in the territory. Several apartment and office buildings have been erected, within recent years, for this client, and others have been initiated. At the same time the company has built millions of dollars worth of structures for other interests in Lima and throughout Peru, including the Hotel Bolivar, a fire-proof structure, rated one of the finest hostelries in South America; a group of fourteen buildings for the Hospital Loayza, considered to be the largest institution of its kind in the hemisphere; the headquarters of the Banco International de Peru, the Royal Bank of Canada, and the Banco Italiano, as well as numerous business structures, government buildings, breakwater, wharf, sewer, water, paving and other developments and projects. The contracts filled by the Ley concern, in the Lima district alone, in 1928, exceeded $5,000,000.

That year, subsidiary companies were organized in Santiago, Chile, and Bogota, Colombia, and included in the contracts in the former city were a nine-story reinforced concrete building for the government-owned newspaper, *La Nacion*, which cost $500,000, another government building which represented an expenditure of $300,000, and a branch bank building for the National City Bank, of New York.

Thus is observed the part that is being played by a Springfield corporation in the advancement of a region rich in potentialities and located on the west coast of South America.

To attempt to enumerate the engineering and construction triumphs of the parent company in this country would be to catalog many of the outstanding structures that have been erected in the United States during the past thirty-five years. At the outbreak of the World War, the Ley concern segregated its activities on war construction, and practically all of the buildings erected at Camp Devens, in Ayer, were built by it, many millions of dollars being represented in these contracts.

When formed as a copartnership less than forty years ago, the con-

cern had initial capital of $500. Today it has net tangible assets of almost $8,000,000.

Throughout its history, the company and its predecessors have continuously engaged in the business of constructing office buildings, apartment houses, hotels, banking houses, industrial plants, railways, dams, power plants, bridges, water supply and hydraulic systems, transmission lines, etc. The greater part of this construction has been accomplished on a cost plus basis, which makes for stability of earnings.

It is also engaged in the development, control, and operation, for its own account, of large real estate projects, located in New York City. One of its most recent contracts has been the erection of the Chrysler Building in that city, the tallest structure in New York.

With capital of $1,250,000 and employing all the way from 3,000 to 5,000 men, this concern ranks as one of the great construction units of America.

Harold A. Ley is president and Fred T. Ley is secretary and treasurer, they with Leo L. Ley constituting the board of directors.

THE W. M. YOUNG REGALIA COMPANY

In 1893 Charles L. Young and Loring Hosley established the business which, seven years later, became the W. M. Young Regalia Company, when the enterprise was purchased by Joseph W. and W. M. Young.

In 1906 the concern was incorporated under the present name, with W. M. Young as president and J. W. Young as treasurer. Since 1921 the latter has held both offices.

The business is confined chiefly to New England, and has shown an even growth from year to year.

For a number of years in its early history the company was quartered at 33 Lyman Street, whence it was driven, in December, 1910, by a fire starting in another establishment. It removed temporarily to quarters on the north side of Taylor Street. Since February, 1911, the business has been located on the second floor of the Myrick building. A large part of the work of manufacturing the regalia is done there, with special machinery, and items not produced directly by the company are stored there waiting to be made up into the lines or sold in their original form.

In the period covered by the history of the concern a great many organizations have come into being, and it is said to have made the first badges worn by the Boy Scouts of America. As long as man maintains his bent for social activities, so long will organizations for young and old flourish, and with these will go the demand for distinctive emblems.

The number of fraternal organizations requiring insignia to a greater or less extent has come to be very large, and many secret societies have numerous constituent or affiliated groups whose members wear special distinguishing costumes and emblems, while the total of insurance organizations bearing the fraternal stamp is surprisingly large. A host of miscellaneous organizations contribute to swell the ranks of users of such material.

Growth of the convention movement has done much to increase the demand for badges, and the spread of outdoor camping activities has been another agency in increasing this demand. Another notable factor is seen in the outings staged by large commercial organizations which use pins and badges partly for advertising purposes. Joseph W. Young is president and treasurer, and D. G. Young, secretary.

SOME LOCAL ENTERPRISES OF THE NINETIES

On January 3, 1894, the Springfield Planing & Moulding Company was incorporated, and on the nineteenth of the same month, the F. L. Hewes Paint Company received its charter, being capitalized for $6,000.

The Springfield Webbing Company was incorporated on January 25th of that year, with capital of $15,000, since increased to $25,000. It employs fifty operatives in the manufacture of woven cotton narrow fabrics, including webbing and tapes. W. J. Hyland is president and treasurer, and W. J. Hyland, Jr., secretary.

The Dexter P. Lillie Co. was established in 1894, and was incorporated in 1917, with capital of $75,000. It is engaged in the manufacture of cotton and woolen wiping waste, and has thirty-five employees. Dexter P. Lillie is president and treasurer and L. B. Lillie superintendent.

On May 1, 1895, the Springfield Iron Works, Inc., was incorporated, with capital of $200,000. It manufactures electric and hydraulic elevators and now has capital of $50,000. A. J. Youngberg is president, J. E. Broberg secretary and A. Beckman treasurer.

The same year the Brightwood Box Machinery Company was established, with $50,000 capital. In August of that year, the Springfield Engine Stop Company was incorporated with capital of $100,000, and on August 10, the Springfield Machine Screw Company was formed, with $5,500 capital.

C. P. CHASE & CO., INC.

In 1895, Charles P. Chase moved to Springfield, from Lyndonville, Vt., where he had been engaged in lumbering and logging operations, and purchased the Marsh & Murray and the Day & Jobson lumber yards, consolidated the two, and began business under the name of C. P. Chase & Co. In 1907, the present site of the company's operations, on Birnie Avenue, was purchased, and the plant was removed to that location.

Upon the death of Mr. Chase, in 1917, two of his sons, Junius B. and Lyndon H., continued the business for a year until the death of the former, in 1918, at which time H. A. Bellows was admitted to the firm. A year later, when Russell D. Chase, a third son of the founder, returned from military service, with the Twenty-sixth Division, he became a member and later the business was incorporated, with L. H. Chase as president, H. A. Bellows treasurer and Russell D. Chase secretary.

The prominence of the executives of the concern in the lumber trade of the Commonwealth is evidenced by the fact that Charles P. and Lyndon H. Chase and H. A. Bellows, of this company, all served several terms as president of the Massachusetts Lumber Dealers Association. The corporation has capital of $100,000.

On November 13, 1895, the Hough Cash Recorder Company was incorporated, with capital of $30,000, and on the 21st of that month, the Springfield Eureka Hard Plaster Company was formed, with capital of $20,000.

The Springfield Construction Company was incorporated January 18, 1896.

THE BROOKS BANK NOTE COMPANY

In 1896, the Brooks Bank Note Company, which had been established in Boston, removed to Springfield, and was incorporated, with capital of $75,000, which has since been increased to $400,000.

For some time it carried on business in the large brick building at the

corner of Hillman and Dwight streets but for more than twenty years it has been located on Wilbraham Avenue, housed in a group of buildings expressly planned to meet its requirements, with ample room for expansion and a railroad siding where seven cars can be accommodated at one time.

Joshua L. Brooks is president and treasurer, M. L. Brooks vice president, and A. D. Cutter, secretary. George T. Clarke, who started with the company in Boston, and who has been identified with it continuously, is general manager, J. Loring Brooks being sales manager and assistant treasurer.

The company has branch offices in Portland, Boston, New York and Philadelphia and upwards of 100 operatives are employed.

The name of the concern does not in any way indicate the products of the company. It was originally adopted to fit the lines of enterprise in which the concern was first active—that of printing bank supplies, stock certificates, and bonds, and the name has been retained because of the reputation and goodwill that has come to be associated with it over a period of forty years in the lithographic business.

As a matter of fact, the printing of certificates, bonds and checks has been largely supplanted by the lithographing of folding paper boxes, labels and display containers, and general lithographic advertising material. The printing of high-grade lithographic stationery continues to be a large part of the company's business.

The Brooks Bank Note Company is one of the few folding-box manufacturers using lithography exclusively. It recently installed for multicolor work a very large lithographic press, said to be one of three such presses in this country, and is now extensively increasing its equipment for multicolor printing. By the latest improvements it can lithograph as many as four colors in one operation.

The Springfield Elevator & Pump Co. was incorporated April 2, 1896, and on August 12 the Hutchins Narrow Fabric Company was formed, with capital of $40,000.

The Cycle & Tool Co. was incorporated on November 13, 1896, with $27,000 capital, and on December 30th of the same year, the M. D. Stebbins Manufacturing Company was formed.

Two of the local concerns incorporated in 1897 were the Natrick Underwear Company and the R. H. Long Shoe Company, each with capital of $30,000.

In 1897, Paul Weidenmiller, a native of Saginaw, Mich., who removed to Springfield in the early '90s, where he obtained employment in the United States Armory and later worked for his uncle, Frederick V. Varin, then engaged in the grinding, cutlery and barbers' supply business, which had been started in a small way in the '80s, bought the enterprise, and broadened the lines by manufacturing industrial and planer knives.

At the same time the barber supply business, which included the manufacture of hair tonic and face applications, increased in proportion. Immediately after the World War more attention was paid to meeting the demand for such goods for the feminine contingent. Beauty shops were springing up on all sides, the use of cosmetics took a jump and the fashion of bobbed hair boosted the popularity of the marcel wave, the permanent wave and various special devices to make the bobs attractive.

At this juncture Mrs. Gladys Weidenmiller Hubbard, daughter of Paul Weidenmiller, resigned her duties as secretary to one of the officials of the American Bosch Magneto corporation, to take charge of the barbers' and

beauty shop supply division of the Taylor Street establishment. With her special interest and apt leadership the concern soon came to occupy a broader field in this domain, and on March 15, 1926, the company known as Paul Weidenmiller, Inc., was formed. Since then the business of supplying beauty parlors has undergone a special development. The concern manufactures and distributes its own line of face creams, powders, shampoos, hair tonics and rinses, the list of items having been extended until it comprises 100 or more. With the preparations go various items of equipment for cleansing and drying the hair, producing permanent waves, treating the scalp, facial contouring, reducing, and the like.

On October 1, 1929, the Paul Weidenmiller Grinding Company and Paul Weidenmiller, Inc., removed to a new location, at 9 and 11 Market Street, where, on the ground floor, is located the retail store, with the second and third floors devoted to offices and manufacturing, display, demonstration, stock, shipping and storage departments. The floor area now occupied is 7,500 square feet as against 3,200 formerly used.

Mr. Weidenmiller is president and treasurer of both companies. William Reed Kelly is manager of the grinding establishment and Mrs. Gladys Weidenmiller Hubbard is manager of the barbers' and beauty shop supplies. Albert G. Hubbard is sales manager.

On January 8, 1898, the Planet Manufacturing Company was incorporated, with capital of $25,000, and the same year the Whittier Mills Company was formed, being capitalized for $70,000.

WRIGHT & DITSON VICTOR COMPANY

The Victor Sporting Goods Company was incorporated in 1898, with capital of $50,000, and just twenty years later the Wright & Ditson Victor Company was organized under the Massachusetts charter of the Victor Sporting Goods Company and represents a consolidation of Wright & Ditson, of Boston, which was founded by George Wright and Harry Ditson, in 1871, and of the Victor Sporting Goods Company, organized in 1898, by Charles B. Whitney and Frank J. Faulkner.

Wright & Ditson specialize in lawn tennis supplies and athletic clothing and golf, while the Victor unit devoted its production to baseball, football, basketball and gymnastic supplies. The consolidation brought about a combination of the selling departments of each, and the new concern became the largest manufacturer and distributor of tennis balls and racquets in this country, and one of the largest makers of baseball, football, basketball and golf supplies. The Victor line originated with the old Overman Wheel Company, makers of Victor bicycles, in 1893, and production was carried on in the old Overman plant until 1900, when removal was made to the Steam Power Building, in Springfield, and in 1913 the present plant in Brightwood was purchased, which, with additions, permitted a doubling of capacity.

Retail stores are maintained in Boston, Worcester, Cambridge and Providence, and distributing branches in New York, Chicago, San Francisco and Toronto, Canada.

Three hundred hands are employed by the concern, which has capital of $75,000. George Wright is president, W. E. Faulkner secretary and C. B. Whitney treasurer and vice president.

THE INDIAN MOTORCYCLE COMPANY

In 1897, George M. Hendee formed the Hendee Company, which was incorporated on October 6, 1898, with capital of $5,000.

Twenty-nine years ago on a bright May morning a loud popping and a series of minor explosions in the vicinity of Cross Street hill in Springfield announced to a waiting world that the first American-built motorcycle, with none other than George M. Hendee himself of that city astride it, was making its first successful demonstration as a practical means of transportation. It was during 1901 that Mr. Hendee, widely known locally and throughout the East as a manufacturer of bicycles and as a racer of no mean reputation, joined forces with the designer of the motorcycle, Oscar Hedstrom, and together they started to place the "motor-driven bicycle" on the market.

Motorcycles had made their appearance in this country previously, but they were of foreign make and of such complicated design and with such a vexatious propensity for getting out of order that only those of great daring and still greater means were able to purchase and operate them.

In 1900 Mr. Hendee owned a half-interest in a six-lap board track where a feature of the entertainment was motor-paced bicycle races. For these events, foreign motors were used, the uncertainty of which proved very unsatisfactory both to riders and the public. Casting around for a remedy, Mr. Hendee had his attention attracted by reports of the successful operation of the "Hedstrom motor," designed by Oscar Hedstrom, of Brooklyn. The two formed a simple contract and steps were immediately taken toward developing the motorcycle for general use. Within a year the first machine was completed on the top floor of the old King Building on Worthington Street. The new vehicle was christened the "Indian" and the first public demonstration was announced. The year 1902 saw the first production in quantity which totaled 142 and the following year 400 were turned out.

The original Indian had a 1¾ horse-power engine, one-cylinder motor, 22-inch frame, single-tube tires and weighed but ninety-three pounds. The gasoline tank, which was fitted to the rear mudguard, gave it the name of "camelback," which stuck to it during the seven years that this design was maintained.

The little company soon outgrew its Worthington Street home and in 1905 moved to the present location in Winchester Square, the former home of the Technical High School. In 1910 the company was forced to erect a larger building, crossing the New England tracks and occupying three acres of land, containing more than ten acres of floor space. The twin-cylinder motor was introduced in 1905 and later improvements such as automatic lubrication, magneto ignition, the spring fork, spring frame, mechanical starting, and many up-to-date devices and attachments were added from time to time. During its growth the company entered machines in various endurance and speed contests, taking first place in a majority of the events. During the war thousands of machines for European use were turned out at the local factory, and in recent years such vehicles as the individual taxi, armoured motor-cycle and fire patrol have been manufactured in large numbers.

The Indian Motorcycle Company, the corporate successor of the Hendee Manufacturing Company, has capital of $12,500,000 and employs 1,200 operatives, in the manufacture of motorcycles and bicycles.

Sales prospects, in both the domestic and foreign fields, have shown a marked improvement in recent years. The manufacture of its commercial car bodies in its own plant, a departure from past practice, has been a factor in increasing the volume of factory operations. An improved windshield was recently brought out and adopted as equipment

for the Indian machine and is being manufactured for the company by the Springfield Upholstery & Metals Co.

In 1928 it added a new automotive product—the Indian inertia shock absorber, which is said to have been redesigned from a product originally developed by Horace Stuart, chief engineer for Robbins & Meyers, of Springfield, Ohio.

While the device has not as yet been adopted as standard equipment by any car manufacturers, its sales prospects are regarded by Indian officials as particularly good.

THE GENERAL ICE CREAM COMPANY

From the selling of milk to the retail trade to a corporation with capital of $1,500,000 in less than thirty years, is the story of Tait Brothers, the Springfield ice cream manufacturers. It was not until 1898 that they made their entry into this field. The following year they built their first plant, and in 1913 erected another, 40 by 160 feet, three stories high, which was duplicated in 1922 by a building which doubled the Springfield capacity, while branch plants have been established in the meantime in Holyoke, Northampton, Fitchburg, Worcester, New Bedford, Willimantic and New London, an interest taken in an establishment in Bridgeport, with a selling agency in Boston, and a condensed milk factory in Bangor, N. Y.

They were then using 500,000,000 quarts of milk annually in manufacturing ice cream, and on July 4, 1921, they made at the Springfield plant alone 6,430 gallons, the annual production during the season at that factory being 400,000 gallons. Butter, cream cheese, and evaporated milk constitute the other products of the concern. The concern manufactures its own motor-trucks, in Springfield.

In 1929 the company's Stafford Street plant was enlarged, and new machinery installed that doubled its capacity for bottling milk for the local trade. It also constructed the same year fifty two-ton trucks, with refrigerator bodies, to increase the size of its fleet.

The corporation contracted in 1929 for 270 carloads of cream, costing about $1,250,000, a supply sufficient to meet only part of its requirements for that year. In addition to what it turns into ice cream the corporation supplies, through its subsidiary, the Franklin Creameries corporation, upwards of 15,000 dealers in the northeastern states.

On July 21, 1898, the Wright-Thayer Company was incorporated with capital of $10,000, and in March, 1899, the Springfield Breweries Company was formed, its capitalization being fixed at $2,500,000. The Springfield Brick Company was incorporated on July 18, 1899, with capital of $50,000, which has been increased to $150,000.

H. G. Fisk is president and H. E. Clark treasurer and secretary and 125 hands are employed in the manufacture of brick.

On September 30, 1899, the Bullard Camera Company was incorporated, with capital of $100,000.

The Hampden Zinc & Lead Co. was incorporated January 10, 1900, with capital of $150,000, and in March of the same year the Brightwood Brick Company was formed, its capital being fixed at $18,000.

THE CHAPIN & GOULD PAPER CO.

In March, 1900, the Chapin & Gould Paper Co. was incorporated, with original capital of $200,000. Its main office is at 317 Main Street, Spring-

field, but the company's manufacturing operations are carried on at Huntington, where 125 hands are employed in the production of paper. The corporation has capital of $200,000, Charles L. Chapin is president and treasurer, and Harold W. Hixon is assistant treasurer and secretary.

THE BAKER EXTRACT COMPANY

The Baker Extract Company was established in Portland, Me., by Maurice Baker and associates in 1890, and removed its plant to Springfield in 1900. The late president, T. Walter Carman, entered the employ of the concern as a stenographer and in 1895 was chosen treasurer, and in 1912 became president. The concern now occupies one of the most modern concrete and steel plants in Springfield, and there produces the finest of flavoring extracts under up-to-date sanitary conditions.

Within recent years sales conferences of its traveling representatives have been regularly scheduled, and bulk distribution to the ice cream, confectionery, bakery, hotel and restaurant trades has been inaugurated, while at the same time the company has devised new methods to promote sales of its products through the retail grocery stores. In this connection a new line has been introduced for the decoration of cakes, consisting of a paste manufactured in eight different colors and put up in small tubes. An assortment of four colors is offered in a package for the convenience of housewives, and with this goes an aluminum decorator that makes it easy to embellish the cake with various ornaments and designs. The same idea has been applied to the commercial trade, with the colors provided in large size tubes.

The concern has capital of $150,000, and employs 100 operatives. William J. Sunn is president, treasurer and secretary, and Harry E. Mason, vice president.

The Alaska Knitting Company was incorporated April 28, 1900, followed by the Springfield Electrical Manufacturing Company, on May 11, with capital of $10,000.

THE MOORE DROP FORGING COMPANY

On October 11, 1900, a concern which, during the intervening three decades, has grown to be one of the city's leading industries, was incorporated, with $30,000 capital—the Moore Drop Forging Company, now operating large plants in both Springfield and Chicopee, in which upwards of 1,400 hands are employed.

A. H. Chapin is president and treasurer, J. M. Collins and F. D. Fuller vice presidents, F. D. Fuller general manager, and F. S. Hatch, assistant treasurer.

The Sherbet-Taca Company was incorporated in November, 1900, with capital of $100,000, and the following month the Davis Tire Company was formed, with capital of the same amount.

The Larsson Whip Company, capitalized for $25,000, and the Skalon Whip Company, with capital of $200,000, were incorporated in January, 1901, and on March 4, the Metal Castings Manufacturing Company came into being, with capital of $150,000. On the sixteenth of the same month, the Novelty Blind Operator Company was incorporated, with capital of $100,000, and the Lenkos Company was formed in April.

On May 1 of that year, the J. W. Steere & Son Organ Company was incorporated, with capital of $50,000.

THE BAY STATE THREAD WORKS

On September 2, 1902, the Bay State Thread Works were organized, with $90,000 capital, and at the outset 8,000 square feet of area and twelve to fifteen workers were utilized. Less than a quarter of a century later the authorized capital of the concern was $425,000 and the normal force of employees was 150, while 45,000 square feet of manufacturing space were employed. The advance of this company has been due to the activities of Clarence E. Chaffin, who entered its employ as an accountant in 1906, and who successively served as acting superintendent, superintendent, vice president, general manager and treasurer. It dyes, bleaches and finishes skein yarn, and handles 4,000 pounds daily. J. T. Herrick is president and C. E. Chaffin is secretary and treasurer of the corporation.

In 1928 the company added a three-story brick structure to its plant, for storage and shipping, and established a new branch office in Kansas City, in addition to those maintained in New York, Philadelphia, Cincinnati, Milwaukee, St. Louis and Lynn. It also operates a branch plant in the latter city.

THE HAMPDEN LUMBER COMPANY

In 1902 Timothy D. and Charles S. Potter founded the Hampden Lumber Company, the former becoming president and the latter treasurer, while George S. Lewis, of Holyoke, became associated with the enterprise at its inception, and later was chosen president, a position he still holds. Mr. Potter is treasurer of the corporation, which has capital of $75,000 and employs 100 hands. J. M. Oliver, Jr., is assistant treasurer. It is the Hampden County distributor of the Curtis woodwork.

THE FIBERLOID CORPORATION

The history of The Fiberloid Corporation, an enterprise which requires the constant services of upwards of 1,000 operatives, and utilizes $4,000,000 in capital, is typical of that of many another Massachusetts industry, which found itself facing extinction because of a changing market for its manufactured products. In the heyday of the paper collar and cuff era, and at a period when Springfield held a high position in the manufacture of those types of wearing apparel, the United Manufacturing Company, of that city, was engaged in producing, among other articles, millions of collars and cuffs.

Its promoters and officers, including Silas L. Kenyon, George W. Tapley, and J. D. Parsons, of Springfield, and Julius Levine, of New York City, desirous of capitalizing their experience in the collar and cuff industry where it would assure the most profit, interested themselves in the Solid Fibre Company, of Newburyport, an established concern, then operated by Edward F. Coffin, engaged in the production of pyroxylin commodities, manufactured in sheet form for piano keys and finished collars and cuffs. The Newburyport enterprise was in the market for additional capital, and after investigating the concern, the Springfield group of manufacturers decided to form a new corporation to succeed the Solid Fibre Company, and created the Lithoid Manufacturing Company, in January, 1888, with capital of $200,000. The new enterprise carried on operations for two or three years, at the end of which period the personal assets were disposed of, while the realty was retained, the principals in the venture turning their attention to other lines.

During the next three or four years, the group previously interested in

the Lithoid Manufacturing Company, desirous of again engaging in the pyroxylin venture, reorganized the corporation, in 1894, under the name of The Fiberloid Company of Maine, which was capitalized for $20,000, and acquired all the assets of the predecessor company, which had not relinquished its charter up to that year.

Operations were successfully carried on at Newburyport until early in 1904, the business increasing in volume and variety of output, and that year the promoters feeling that if the enterprise was to continue to expand, it must be located in a larger center of population, with a wider labor market than was afforded in the Essex County town, decided to transfer production to Springfield, where there existed opportunities to acquire a sufficient area of land that would permit plant extensions if required in the future.

The Fiberloid Company of Maine immediately purchased sixteen acres of land, on the bank of the Chicopee River, in the Indian Orchard section of Springfield, upon which it erected a modern plant of such size as it was considered would care for the required output at that period.

In 1911 The Fiberloid Company of Massachusetts succeeded the Fiberloid Company of Maine, with paid in capital of $3,000,000, and five years later the concern was reincorporated as The Fiberloid Corporation of Massachusetts, with capital of $4,000,000.

In 1914, the original plant was extended to approximately twice its size. The organizers of the predecessor companies laid a substantial foundation upon which the present management has developed a large and prosperous business of national and even international reputation.

The production capacity since 1916 has been continually increased year by year allowing for the manufacture of new materials, not the least of which is the corporation's lacquers, under the name of "Fiberlac" and sheet material for the manufacture of laminated glass for automobile wind shields and windows.

Other products consist of sheet cellulose which meets the demand for many requirements, among the better known of which are those of toiletware, cutlery handles, automobile curtains, tooth brushes, bathroom accessories and fixtures, fountain pens, golf stick faces, shoe findings, advertising novelties, jewelry adornments, imitation leather dressings and many other articles of practical use.

The Indian Orchard plant consists of forty buildings, all protected against fire by three distinct and inexhaustible supplies of water, and the company maintains its own organized fire department composed of employees.

The corporation operates a finely equipped cafeteria, under the management of an experienced dietician, and an emergency hospital is maintained, which is in charge of a graduate nurse.

The present officers of the corporation are: Howard R. Bemis, vice president and treasurer; John C. Brooks, vice president and general manager; and Arthur B. Reed, clerk.

THE H. A. MANNING COMPANY

Another Springfield enterprise that takes its place as a twentieth century concern is the H. A. Manning Company, which was established in February, 1905, by Herbert A. Manning, to publish six city and town directories in the states of Massachusetts and Vermont.

Ten years later the business had grown to seventeen publications, and



WHERE FIBERLOID CORPORATION BEGAN BUSINESS



PRESENT PLANT OF THE FIBERLOID CORPORATION, INDIAN ORCHARD

in 1915 the concern was incorporated, with capital of $20,000, which was increased to $50,000 five years later.

In 1928 the company's publications numbered fifty-seven, located in Massachusetts, New Hampshire, Connecticut, Vermont, New York, Pennsylvania and New Jersey. The roots of this growing business are many and many had their origin in the nineteenth century. The following companies, with the approximate dates of their establishment, have been absorbed by the H. A. Manning Company: The Berlin Publishing Company, 1890; Raymond & Co., 1900; R. S. Dillon & Co., 1868; L. P. Waite & Co., 1874; Bass & Co., 1890; The Marlette's, 1870; C. H. Bame & Co., 1870; the Elmira Advertiser Association, 1890; the Union Publishing Co., 1890; William J. Kline & Son, 1880; F. P. DeVinne, 1895; Guy Richardson, 1902; the James Publishing Company, 1901; W. E. Shaw, 1886; W. H. Taylor, 1896; A. M. Meek, 1913; Charles A. Richmond, 1920; Charles A. Goodhue, 1890; the Otsego Publishing Co., 1890; Dean & Schindelmyer, 1900; W. S. Ryan, 1890; E. S. Bence & Co., 1908; the H. M. Meek Publishing Company, 1880.

The company publishes city, county and industrial directories, city maps, mailing and trade lists, and carries on house numbering contracts and statistical work. The main offices are at 33 Lyman Street, Springfield, with branches at 434 State Street, Schenectady, N. Y., and 98 Park Place, New York City, while thirty-five free directory libraries are maintained by the concern.

The officers are: Herbert A. Manning, president and treasurer; Mabel C. Manning, secretary; directors, Herbert A. Manning, Edward R. Leslie, Alan M. Manning, Annie M. Hutchins and Mabel C. Manning.

In 1907, Samuel and Herman Green began the manufacture of confectionery under the firm name of Green Brothers, purchasing the business of the Royal Candy Company, of Springfield, in 1916, and admitting a younger brother, Eli, to the firm at that time, which became known as the Green Brothers Company. The plant was greatly enlarged and in 1924 the concern was incorporated with capital of $125,000, with Samuel Green as president, Herman Green as vice president and treasurer, and Eli Green, secretary.

THE JOHN R. LYMAN COMPANY

From a piece of a knitting mill remnant carried in the overcoat pocket of John R. Lyman in 1907 there grew in a period of twenty years a business whose sales attained $650,000 in 1928, and representing the use of 1,600 tons of cloth in its products.

In the former year, John R. Lyman and his brother conducted not only a cloth wiper business but also a metal polishing concern, and at the beginning the two enterprises occupied about 5,000 square feet of space and employed five persons. Today, upwards of 50,000 square feet of manufacturing area are utilized and 100 operatives are employed. In 1920 a separation of the two units was deemed desirable and the Lyman-Beers Company was formed to handle the metal polishing manufacture, Mr. Lyman becoming president and A. L. Beers, treasurer and general manager. The concern did a business of $125,000 in 1928.

The cloth wiper business consists of colored and white mill ends, soiled and cleaned, and the reclaiming of old underwear and old colored garments, and in 1924 the reclaiming end of the business was placed in a subsidiary concern, known as the Commercial Laundry Company, which has effected very material savings in overhead costs.

Fifteen salesmen are employed, who travel the territory from Maine to Florida, and from Boston to Milwaukee. The John R. Lyman Company is now looking forward to occupying a building of its own, and of engaging in cloth specialty manufacturing. The John R. Lyman Company was incorporated in 1908 and John R. Lyman is president and treasurer, and Jonathan S. Lyman, secretary.

In 1908 the Cave Welding Company was organized in Springfield, and now operates branches in Bridgeport, Norwich and Holyoke, being the first welding concern established in the country, and specializing on boiler and tank work. Henry Cave is president, J. Frank Tucker vice president and George S. Smead, treasurer.

HAMPDEN AUTOMOTIVE PRODUCTS, INC.

The Hampden Auto Top & Metal Company was organized in 1908, and became one of the pioneer concerns in the business of manufacturing fabric equipment for automobiles. Today its products are shipped to the middle west and the Pacific coast in competition with similar companies operating in these sections.

Its rumble seats, rumble seat tops, seat covers, wind shields, tire covers, and the like are as popular today as when first placed on the market. Sales of seat covers rose from 14,000 to 50,000 in one season, and the orders booked by the concern in the first three months of 1928 exceeded the total of the entire 1927 business of the concern, which ran into the hundreds of thousands of dollars. Payrolls now run from $12,000 to $15,000 a month, and the company recently placed a single order with a New England mill for $150,000 worth of material.

It became necessary in 1926-27 to triple the size of the company's plant within a twelve-months period and a national advertising campaign carried on by the unit has been very successful.

In 1929 the name of the concern was changed to Hampden Automotive Products, Inc., and it entered upon the manufacture of plush laprobes of various colors, seat covers for both the domestic and foreign fields; fender flaps, tire and top covers, sun visors and canvas golf bags.

Through its enterprise in sensing the public demand for new devices to promote the convenience and comfort of motorists, this company has prospered and built up a good volume of business that extends all through the year. More than 100 persons are now employed by it.

Meyer J. Schwartz and Louis Lavin founded the enterprise, being engaged at the outset in the repair of automobile cushions and tops, and then expanding into the building of auto bodies.

The company's first outstanding departure was the introduction of the so-called California top in 1910. This enabled the owner of an open car to enjoy much of the advantage pertaining to the closed car. For some years the demand for winter enclosures ran strong, and they are still being made to some extent for the convenience of drivers who are attached to the use of open cars.

The company materially enlarged its Winter Street plant in 1929 and it now maintains a New York office, at 200 Fifth Avenue.

In 1911 the C. S. Axtell Company was formed to engage in general printing, but soon the executives turned their attention to offset lithography, and now its output consists of letterheads, envelopes, advertising matter, box tops, diplomas, and certificates. In 1928 the company installed a new automatic paper cutter, imported from Germany, notable for its size, weight and strength, and which, because of the fact there is but

one other like it in America, resulted in being officially inspected after its installation by the United States Government representative, from Washington. The company does not confine its activities to the domestic field, but executes many orders for firms abroad.

C. S. Axtell is president, C. P. Reilly, treasurer, and E. G. Robson, vice president and secretary.

THE STANDARD ELECTRIC TIME COMPANY

In 1912 the Standard Electric Time Company, founded in 1884, in Waterbury, Conn.—the center of the clock business of America—established itself in a modern plant, in Springfield, originally built for the manufacture of tissue paper.

The concern had been incorporated under the laws of Connecticut, in 1887, but at that period electric time equipment was considered more or less of a luxury, and the company found that much educational effort would be required to bring school and factory officials to appreciate the value of this sort of time equipment.

It left Waterbury and moved to Boston where it operated for a few years before relocating in Springfield, but by the time it was established in the latter city, the industry was settled on a firm basis with a rapidly expanding future. The public has come to realize the value of standard electric time service and the demand increased so rapidly that the company has experienced a very rapid growth in recent years. The service has been adopted in factories, railroad stations, banks, office buildings, courthouses and hospitals. In recent years it has been necessary to double and quadruple the Springfield plant and several important additional lines are now being manufactured by the company.

These include besides the complete electric time equipment in schools, fire alarm and telephone systems, equipment for industrial plants, comprising electric time clocks, time recorders electrically controlled, automatic dismissal signal, automatic calling systems, and outside illuminated clocks.

Various types of tower clocks and outside clocks are manufactured and used widely on bank buildings. Recently the company has manufactured a special bus terminal starting system, and equipment for scientific laboratories by means of which various voltages can be secured readily on special panel boards. The concern also finds applications for many of its devices in special industrial manufacturing processes.

Complete sales and service branches are maintained in twenty-three of the largest cities in United States and Canada.

In 1929 the company introduced a new line of signalling apparatus specially designed for hospital use, including a nurses' calling system, and a physicians' in and out paging system, all protected by eight United States patents. A new two-wire automatic resetting electric clock system was also placed in operation in the Springfield factory, in 1929, consisting of a self-winding master clock with several types of secondary clocks and operated from a 110-volt power circuit.

The corporation has capital of $500,000 and employs 125 operatives. George L. Riggs is president, C. M. Whiteford, vice president, Charles B. Fitts, treasurer and sales manager, and Lester P. Cunningham, secretary.

THE LARGEST PACKAGING MACHINERY CONCERN IN THE WORLD

It was early in the present century that there began the evolution in the methods of distributing food products.

Consumers had long realized that the old bulk style prevalent in the corner grocery was unsanitary, uncertain, slow and unbusiness-like, while the manufacturers realized that, in the bulk handling of their products, they were absolutely helpless against adulteration, substitution, and other fraudulent methods.

Health officials and commissioners were freely criticizing the unsanitary conditions surrounding the marketing of food, with the result that the aid of legislatures was invoked to protect the health of consumers.

These progressive steps led to the idea of marketing food products in packages that were carefully wrapped, labeled and sealed, and these advantages were quickly realized by the consumers, who knew they were receiving the brand of goods they called for, and that it came to them in the original clean and sanitary package.

Up-to-date manufacturers welcomed the change, and the policy grew rapidly, but at the outset all wrapping was accomplished by hand, which was slow, expensive, wasteful, and which required an immense amount of space.

Convinced that the package method was not an ephemeral factor, but that it had come to stay, inventive genius was challenged to find the way out of the dilemma and naturally, not a few became convinced that mechanical wrapping was the only solution of the problem. In 1907, several devices for automatic wrapping appeared, each being sponsored by its own hopeful and optimistic promoters.

Then followed a period of intensive development of machine wrapping, the progress of which was little short of remarkable, and but little realized by the average consumer, with the result that automatic machines that were marvels of ingenuity, speed and workmanship were evolved that rank high in the field of American invention and labor-saving devices.

Those who assert that the spirit of invention is dead in this Commonwealth have no conception of the part that has been played by Springfield men in this field, for it was here that some of the earliest and most successful developments in this field were carried on, and it is a matter of history as well as of common knowledge in the wrapping machinery world that the city is now the home of the largest company in the world devoted exclusively to the manufacture of devices entering the package field.

In 1912 the Package Machinery Company was formed, representing a consolidation of several small companies, all of which were pioneers in the then new field of automatic machine wrapping, the units including The Armstrong Wrapping Machine Company of Louisville, Ky., The Berger Machine Company of Springfield, The Thomas F. Condon Company of Brooklyn, N. Y., The Giroux Wrapping Machine Company of New York City, The National Wrapping Machine Company of Milwaukee, Wis., and the wrapping machine business of the F. B. Redington Company of Chicago, Ill.

The purposes of the consolidation were: to produce better machines, to eliminate the waste incident to parallel lines of development by the different companies, to make more rapid progress in the art of mechanical wrapping by uniting the efforts of the best engineers connected with these companies, and to effect greater economies in production.

The new company began business in January, 1913, occupying a portion of the old Berger Factory in Springfield, about thirty men being employed, with a weekly pay roll of less than $800. The first year's sales amounted to approximately $140,000. As is not unusual with new con-

cerns, difficulties and discouragements were experienced in the early days and it was not until the election of William L. Putnam, of Boston, as president that the real prosperity of the enterprise began.

He served as president and later as chairman of the board until his death, in 1924, and was succeeded as president by Thomas L. Jefferson, Jr., who had been with the company as vice president since its organization and who had come to it with the Armstrong Wrapping Machine Company of Louisville, of which he was formerly treasurer. Mr. Jefferson's term, like that of Mr. Putnam, was all too short. He suffered a severe nervous breakdown which resulted in his death in December, 1927.

In the meantime, Roger L. Putnam, son of William L., had been chosen as head of the company and is still filling that position. The progress begun under his father's leadership and continued under Mr. Jefferson's has been even more pronounced since Roger L. Putnam has been at the head of the concern.

The original location was soon outgrown and a much larger building was secured, which has been added to from time to time as the growth of the business demanded, and, in the near future, another adjoining property will be taken over and the buildings remodeled or new structures erected to care for the rapidly increasing sales.

From the wrapping of such comparatively easy products as laundry soap, chocolate bars, starch, cereals, etc., the art has advanced until now machines for wrapping such difficult products as ice cream, butter, mince meat, cheese, razor blades, dry ice, Eskimo pies, and many others, constitute a part of the regular output. Where, at the beginning, a machine wrapping as high as ninety packages per minute was considered high speed, the company now builds machines capable of wrapping, in three wrappers and banding in packages, as high as 600 pieces per minute. This increased speed requires stronger and heavier built machines. In 1913, the largest did not weigh over eighteen hundred pounds, while today the company builds machines weighing as high as six thousand pounds and the tendency is towards still heavier products.

In addition to the trend towards higher speed and greater weight in machines the company is called on to produce machines capable of quite complicated wrapping such as Woodbury's Facial, Cuticura, and Palmolive Soaps and Sorbetto Sandwiches, as well as machines for bundling—that is, assembling the wrapped packages into a bundle and wrapping the bundle in strong craft paper, either plain or printed. These economically fill the growing demand for dozen or half dozen lots and effect great savings over boxes or containers, as well as in labor and transportation charges. The present day requirements necessitate machines to handle much larger packages than were formerly considered possible and to use other materials than the ordinary printed wrapper, such as waxed paper, glassine, cellophane, and other new materials used in wrapping and protecting packages.

At present the company has a force of 375 employees, with a weekly payroll of from sixteen to eighteen thousand dollars and is manufacturing no less than seventy-five different types of automatic wrapping machines. Over seven thousand of its products are in use in all parts of the world, having an output of more than two million packages per day. Sales have been beyond the million dollar mark in each of the last three years and it is expected that 1929 will show sales of between a million and a half and two million dollars.

Probably few of the leading package goods manufacturers of today

plan to introduce a new package product or to revise their present package without consulting the Package Machinery Company, the wide experience and specialized knowledge of the executives enabling them to suggest important economies in wrapping material and methods. The expansion of the company in 1928 was rendered notable by the absorption of the well-known wrapping machine business of Ferguson & Haas, Inc., of New York. This merger, besides adding several prominent wrapping machine engineers to the company's staff, strengthened it in a number of important fields and helped materially in opening new avenues. The same year, a contract was made with one of the leading European manufacturers of wrapping machines, having a strong sales organization with branches throughout the world, by which a close working agreement between the two companies in designing and developing wrapping machines was effected, together with the proposed exchange of patent and manufacturing rights. It is expected that large benefits in the company's designing and developing departments as well as large increases in its foreign sales department will result from this arrangement.

In addition to the headquarters in Springfield, branch offices are maintained in New York, Chicago, and Los Angeles, with a London representative having agencies in nearly all foreign countries. New fields are being constantly opened both in this country and abroad and the foreign business of the company is growing rapidly.

When you observe on the shelves of the stores where you trade, the chocolate bars, chewing gum, cigarettes, soap, confections, and the like, you are looking at wrappings and packaging that flow in the wake of Springfield-built machines.

Every working day of the year at least two hundred million packages are wrapped by these almost uncanny devices, and the great volume of distribution enjoyed by the common, every-day products has been built up in large measure through the economies and selling advantages obtained by machine wrapping. In fact, in most instances, the profit per unit is so small that hand wrapping would be prohibitive.

In the fall of 1929 the Package Machinery Company secured a substantial interest, together with the Baker Perkins Co., Inc., of Saginaw, Mich., in the National Bread Wrapping Machine Company, of Nashua, N. H., which has been in operation for twenty years, and in the spring of 1930 the plant equipment was moved from the latter city to Springfield, and installed in a building adjoining the plant of the Package Machinery Company.

The Package Machinery Company has capital of $2,046,300. Roger L. Putnam is president, George A. Nohlman, vice president, G. W. Kyburg, treasurer and Rae S. Clark, assistant treasurer and secretary.

THE AMERICAN SAW AND MANUFACTURING COMPANY

The American Saw and Manufacturing Company was organized in 1915 by John T. Swanson, Carl L. Ericson and Carl G. Davis, and began the production of hack and hand saws in a small way, but in 1917 the concern erected a modern brick and fireproof factory, and added a line of Lenox wood cutting hand saws two years later, glass cutters in 1924, and socket wrenches in 1925. Special machinery was invented and installed and the products are marketed throughout the world, branch selling houses being located in New York, Chicago, Atlanta and in Paris, France.

In 1928 the company's plant was enlarged by adding a third story to the main building, which afforded a much needed expansion of manufac-

turing space, of some 5,600 square feet, while the same year the structure formerly used as the company's garage was converted into a sand-blasting department, where hacksaw blades—a new product—are now finished.

This new blade is made of steel alloy containing 18 per cent tungsten as against 2 per cent used in the ordinary hacksaw blade, and the company claims the new product will cut much faster and do six times as much work in a given time. Band saws, screw drivers, and glass cutters are also included in the products of the concern.

Upwards of 100 hands are employed, and Mr. Swanson is president, Mr. Ericson, secretary, and Mr. Davis, treasurer, of the corporation.

THE BOZART RUG COMPANY

The Bozart Rug Company, formed in 1915, now occupies some 40,000 square feet of floor space, and employs fifteen salesmen, four of whom cover the New England territory. It has successfully catered to the increasing demand for fibre and wool fibre rugs which has followed in the wake of the bungalow type of homes, with their spacious porches and sun-parlors, now so prevalent in many parts of the United States and it has aided the fashion so notable in the larger cities of removing heavy wool rugs and carpets in the summer season by designing and producing the colorful creations that comport with the modernistic trend in furnishings. The company was incorporated in 1924, is capitalized for $2,000,000, and employs 400 operatives.

Paul Benedict is president and E. C. Kerans is vice president of the corporation.

THE SPARTAN SAW WORKS

In 1917, J. W. McQuillan, who had been the plant superintendent of the Victor Saw Works, and H. F. Strout, then sales manager of the same unit, founded the Spartan Saw Works, and built the first unit of the plant, which has twice been enlarged since that time, the latest extension being completed in 1929, when a new fireproof heat-treating building was erected, containing 3,500 square feet.

The concern numbers among its customers several airplane manufacturers employing hacksaws to cut steel tubing entering into the construction of planes, and about 15 per cent of the total production of the Spartan Works is in this field. The company now has a plant containing approximately 10,500 square feet of manufacturing space.

THE AMERICAN BOSCH MAGNETO CORPORATION

In December, 1918, the properties of the old Bosch Magneto Corporation, which had been taken over by the Alien Property Custodian during the World War, and which was operated during the struggle almost exclusively in the interests of the United States Government, was acquired by public auction, by the newly organized American Bosch Magneto Corporation. Originally designed to produce a maximum of 10,000 magnetoes a month, by judicious and systematic planning of the mechanical equipment, the new management, without enlarging the buildings, increased the production and marketing organization to such an extent that from April to July, 1920, inclusive, more than 40,000 magnetoes a month were turned out and over 340,000 were manufactured and sold during that year.

At the close of 1918, the new company had secured approximately 12 per cent of the magneto business of the country, and at the end of 1920 it was marketing approximately 50 per cent of the requirements of the

United States. In July, 1917, there were 768 employees on the payroll; on July 1, 1920, 2,886 men and women were engaged in the manufacturing operations at the factory.

In 1921, the extensive Gray & Davis plants, in Cambridge and Amesbury, were acquired, permitting the American Bosch Magneto Corporation to enter the automotive field with new starting and lighting products, and in 1923 and 1924 Ford ignition systems, Fordson governors, electric windshield wipers, with tandem attachments, shock absorbers, and spark plugs were perfected and added to the line, while in 1925 a complete line of radio apparatus and an automobile horn of the vibrating type, were introduced.

The company maintains branches in New York, Chicago and San Francisco, controls over 850 official Bosch service stations, has more than 1,500 official dealers, and employs 4,000 men and women.



AMERICAN BOSCH MAGNETO CORPORATION, SPRINGFIELD, 1928

The Springfield plant is two city blocks long and one city block deep, and has a total floor space of 225,000 square feet, part of which is devoted to a four story brick structure and the balance to saw-tooth steel and brick shops of the most modern equipment.

It is powered and lighted by its own large electrical plant. Employees are carefully provided for with a completely outfitted hospital unit on the grounds, with nurses and a registered physician in attendance.

There is a large restaurant in Bosch Park where lunches are served at cost to employees, and parking spaces are provided on Bosch property for the employees' cars. A two and a half million dollar payroll is required annually to build Bosch products, which find their way to the four corners of the earth.

In 1928, due to large contracts for radio and other commodities the area formerly occupied by the woodworking, packing and storage branches of the company's radio department, was required for manufacturing purposes, and the entire plant of the Birnie Paper Company, containing 100,000 square feet of additional space, was leased, and these departments were transferred to that unit, this latest expansion meaning the employment of 200 additional men and women.

Over four million magnetoes have been produced by the company. Today, more than 15,000 per month of these remarkable precision instruments are being shipped for use on motor trucks, tractors, road graders, marine engines, motorcycles, air compressors, gasoline railroad engines,

stationary engines, airplanes, farm machinery, electric washers, and for a hundred other purposes.

The increased use of gasoline engines in the rural districts has stimulated the demand for magnetoes to a decided extent, and these devices constitute approximately one-third of the present production of American Bosch.

Massachusetts craftsmanship has contributed no small part in making the name Bosch one of the greatest in the automotive and radio equipment industries, and world-wide recognition and acceptance of this name is but another demonstration of the leadership and skill of the artisans of the Connecticut Valley.

Within recent years the company has largely extended its production of radio equipment, and has developed console and table type receivers for alternating current tubes, direct from the light socket operation as well as direct current or battery operation sets. Some have loop antenna and built-in reproducers. It also manufactures nobattry "A", nobattry "B", concert ambotones, recreators, "A" battery eliminators, "B" battery eliminators, eighteen inch cone-type reproducers, and electric phonograph pick-ups.

It closed the year 1928 with a flourishing volume of holiday sales, and as a result enjoyed for the twelve months by all odds the largest profits since the inflationary year of 1919. Earnings after all charges ran well beyond estimates, totaling approximately $5 a share on the 207,399 shares of no-par value outstanding. The gross sales of 1928, amounting to $13,446,000, were the second largest on record, and 70 per cent ahead of those of 1927.

The company seems now better entrenched in both the automotive accessory lines and the radio field than for many years.

How true it is that today's handiwork of Springfield craftsman may be found tomorrow in any one of ten thousand world ports. The Standard Oil craft, winding its way up the hidden and tortuous rivers of benighted China, builds its dependability on the performance of a Bosch magneto. The thresher that uncomplainingly, in the boiling tropical sun of the Argentine, cuts a swath, then an acre, and next hundreds of acres of wheat is driven by a Springfield Bosch magneto. The coffee plantations of Brazil, the sugar fields of Cuba, and acres of wheat in Canada—mines, roads, rivers in unheard-of-places—all depend upon the skill of the Springfield craftsmen, and how quickly the discerning minds of the inventive engineers of that city sensed the future of the radio development and caused Gigli, Schumann-Heink, and Ethel Barrymore to enthusiastically acclaim their triumphs in the field of radio. Today, the American Bosch Magneto Corporation supplies to the waiting world products which a quarter of a century ago were unheard of and even undreamed of, thus rendering a contribution to twentieth century civilization that cannot be determined in dollars and cents.

Arthur T. Murray is president, Morris Metcalf, vice president and treasurer, A. H. D. Altree, Leon W. Rosenthal, and G. J. Lang, vice presidents, and R. O. Washburn, secretary of the corporation.

THE GENERAL FIBRE BOX COMPANY

In less than a dozen years a group of Springfield manufacturers have developed a concern which has grown to be four times as large as it was when it was organized, in 1919. That year the General Fibre Box Com-

pany was established to manufacture corrugated fibre shipping boxes and related products, and its history but serves to illustrate the old adage that "there is no great loss without some small gain," for when, in November, 1927, there occurred a break in the dike, which protects West Springfield against high water in the Westfield River, resulting in the flooding of the company's plant to the depth of eight feet, operations were stopped for less than two weeks.

In January, 1929, the business was merged and became a completely owned subsidiary of the Longview Fibre Company, having its principal place of business at Longview, Washington, at which point large, modern sulphite pulp, boxboard and paper mills and a bag factory are operated.

As a result of the merger, the General Fibre Box Company is manufacturing corrugated fibreboard shipping containers made of Longfibre Kraft exclusively—a very much stronger and lighter weight material than is customarily used for the manufacture of corrugated fibre boxes, and at no higher prices than are ordinarily charged for the usual type of box made of a large proportion of old waste papers.

In February, 1929, a new Massachusetts corporation, bearing the same name as that of the previous enterprise, was organized, the entire capital stock of which is owned by the Longview Fibre Company. The officers of the General Fibre Box Company are: president and treasurer, Clarence J. Schoo; vice president and clerk, Seaman E. Rossetter; directors, the above and H. L. Wallenberg, Myron T. Ray, Charles B. Allison. Mr. Schoo is also one of the vice presidents of the Longview Fibre Company.

THE PACKAGE PAPER COMPANY

In 1919 Arthur Havemeyer came to Springfield to organize the Package Paper Company, the object of which was to provide standard papers that could be employed with minimum wastage and maximum machine production, on automatic wrapping machines, and since its formation the concern has been closely affiliated with the Package Machinery Company, for which it functions more or less as a paper service station.

The contribution that these two units have made in assisting in the development of the package goods industry in contrast to the sale of commodities in bulk, such as was carried on in the old sugar and cracker barrel era, can scarcely be computed in dollars and cents, in efficiency, in sanitation and in overcoming sales resistance.

Mr. Havemeyer was assisted in establishing the Package Paper Company, by William L. Putnam, of Boston, Winthrop M. Crane, Jr., of Dalton, George W. Kyburg, of Springfield, and others. While progress was slow at the start, the company has met with no recessions in volume since it started, and has developed an encouraging export business. It maintains offices in Boston, New York, Philadelphia, Baltimore and Chicago, besides having many agencies in this country and abroad.

In 1929, when it outgrew its original factory, it moved into larger quarters.

Ranking as a paper converter and making chiefly waxed paper without which it would be well-nigh impossible for many food products to attain national distribution, it supplies the necessary material to tobacco, biscuit, bread-baking, cracker, small tool, soap, and a score of other industries.

Arthur Havemeyer is president, G. W. Kyburg, treasurer, and they with W. M. Crane, Jr., R. L. Putnam and H. H. Bundy, constitute the board of directors. The company has capital of $515,000.

THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

Critics who are responsible for erroneous statements to the effect that no new concerns of size have located in Massachusetts in a generation may well take a leaf out of Springfield's and Chicopee's books of experience and read the story of the advent of the Westinghouse Electric & Manufacturing Company.

Early in 1915, that corporation was awarded a contract by the Russian Government for the manufacture of 1,000,000 rifles, and the immediate problem of the executives was to find a site for production. The New England Westinghouse Company was formed, and the corporation acquired the Stevens Arms & Tool Company, of Chicopee Falls, with its allied concern, the Stevens-Duryea Automobile Company, possessing plants in Springfield and Chicopee Falls. Production was begun immediately at both factories and continued until the collapse of the Russian Government, and then the manufacture of Browning rifles for the United States Government was undertaken.

Following the armistice the New England Westinghouse Company found itself with these two plants on its hands, and a study was made to determine to what use the more modern of the two units—the East Springfield Works—could be put, and it was decided to begin there the manufacture of small motors and automotive equipment.

Production began in August, 1919, with less than 500 employees, and in ten years the Westinghouse Company has stepped up manufacture at the East Springfield Works until today upwards of 4,500 men are carried on the rolls at the plant, and the concern has become the largest employer of labor in the city.

It distributes an annual payroll of approximately $6,000,000, and, in addition, purchases locally materials costing nearly $800,000, contributes $430,000 a year in taxes to the city of Springfield, and pays the railroads that serve it over $335,000 a year for transporting the incoming raw materials and the outgoing manufactured products. Included in the East Springfield Works are forty-six acres of land, upon which stand fourteen major buildings, containing 670,000 square feet of manufacturing space, and it has carried as high as 5,227 employees on its local payrolls at the peak of production. Including the 800 employees at the Chicopee Falls plant, and the 450 office workers in both units, the total approaches 5,800 at the present time.

The present production is confined to three horse-power or less of small power motors, in all sizes and ratings, farm motors, commercial radio apparatus, washing-machine motors. The East Springfield executive organization is divided into nine departments, each reporting on matters of personnel and system to a different head at the East Pittsburgh or Mansfield Works, and on all other matters of discipline, the several departments are responsible to the local Works Manager, A. B. Reynders, who is in charge of the manufacturing end, the maximum payroll comprising 5,000 names. To him come the reports from the superintendent, supervisor of production, purchasing agent, captain of police, supervisor of inspection and test, works engineer, supervisors of material disposition, of cost reductions and of welfare and relief.

Three methods of pay are carried on at the plant—one the job basis, which is used in connection with the wages paid to the tool and diemakers, a time value being given for the completed job; the day basis, which is

employed with all individual standard time workers, and the pay basis, which is used for all group workers.

The East Springfield Works are operated under a budgeting and control system, a statement being issued each week of all factory expenses, showing allowances, the actual expenditures and the difference between the budget and the actual expenses each week, as well as the accumulative for the fiscal year period.

The policy adopted at the plant in its efforts to develop men for leadership is interesting, and its practical application is readily apparent, as some of the most efficient executives in various phases of the work obtained their initial experience in the East Springfield Works.

Appreciating that the average college graduate has little or no conception of the ramifications of the average factory, particularly with one devoted to the manufacture of radio apparatus, such as is carried on at East Springfield, which in itself includes practically all known electrical parts in their severest applications, the newcomer is placed in the test division, where he is called upon to make electrical measurements either on the component parts, or on those pertaining to the performance of the completed unit. Occasionally, some young men begin their initial work in the test equipment division. At once, the newcomer finds practical application of the theory which doubtless heretofore was more or less hazy in his mind. Those who show aptitude in applying their theoretical education in a practical way, and who demonstrate initiative and executive ability, are quickly rewarded inasmuch as vacancies are continually occurring in an enterprise the size of the East Springfield Works.

In a hot period such as Massachusetts experiences each summer, one of the strongest attractions, next to a delightful cool swim in some shady pool, is the cooling breeze of an electric fan. But of all those that look to this simple device for relief few stop to think of the large and diversified role it enacts in the performance of the world's work, or of the study and experimentation given to the problem of adapting the fans to the doing of each particular task.

How many Massachusetts people realize that Springfield is now one of the largest producing centers of electric fans in the world? The East Springfield plant of the Westinghouse company has been manufacturing fans at the rate of 1,100 each day for years past, and it turns out annually upwards of 250,000.

Few people realize that these same fans are being shipped to the farthest corners of the world. For example such distant countries as India, China, New Zealand, Australia, South Africa, Italy, England and Mexico are large consumers of this Springfield product, as well as all the South American countries. Approximately 83 per cent of all fans manufactured in Springfield are sold in America, and the rest are exported.

In 1928-29 the company erected a new radio building, of concrete and steel, at the East Springfield Works, 600 by 100 feet in dimensions, which virtually doubles the capacity of the local radio department, and which is believed to be the best arranged and equipped structure devoted entirely to radio manufacture in the world.

The local plant is one of the largest local users of electricity for heat treating processes in Springfield, operating three huge vertical ovens of 90 kilowatts each, thirty feet high, of its own design and construction, which are used for baking parts of fans and motors. The ovens maintain a steady heat of 200 degrees, centigrade. The parts are carried slowly by an endless chain device to the top of the oven protruding through the

roof of the building and before they return they are thoroughly baked. The ovens have a capacity of 10,000 parts a day. The company also uses twelve other box type electric ovens for japanning various parts of fans and motors.

A further important use of electric heat is in operating its four big pitch melting tanks in the radio department, where the pitch is heated to 395 degrees F., and poured into power units, sealing them effectively. Here also electricity is extensively used in the making of the fine parts of radio sets. Nearly 500 operatives are equipped with tiny electric soldering irons with which the wires are deftly soldered in place.

In 1929 the company located its new electric refrigerator unit at the East Springfield works and installed additional machinery to take care of this type of production. The unit is expected to make a substantial addition to the local output.

Along with the constantly increasing output of electrical equipment for the use of industrial plants and central power stations goes the necessity of maintaining such equipment in a manner to assure sustained plant efficiency, conserving the life of the machinery and minimizing the loss from breakdowns. The Westinghouse company operates a service station in Springfield for the purpose of reconditioning equipment produced by that and other electrical concerns. It is one of a chain of such stations spread over the United States and serves a territory including that part of Massachusetts lying west of Worcester, all of Vermont and western Connecticut as far south as New Britain. In addition, it covers Maine and New Hampshire on transformer work.

Approximately one-half of the total operations of this plant, located at 395 Liberty Street, consists of repairing and rebuilding transformers, and the remainder has to do with motors, generators and miscellaneous equipment.

A wide variety of services are given and special equipment is carried that is not ordinarily included in an electric motor repair shop. Among other things a 50-ton press is provided for punching shafts into railway armatures.

Along with its repair shop the company keeps at all times a large and varied stock of materials and parts, including bearings, wires, insulating materials, and parts of motors. Considerable work is done in repairing fractional horse-power motors used for domestic appliances, and in this connection a stock of parts also is carried. Much of the work comes from manufacturers of appliances equipped with Westinghouse motors.

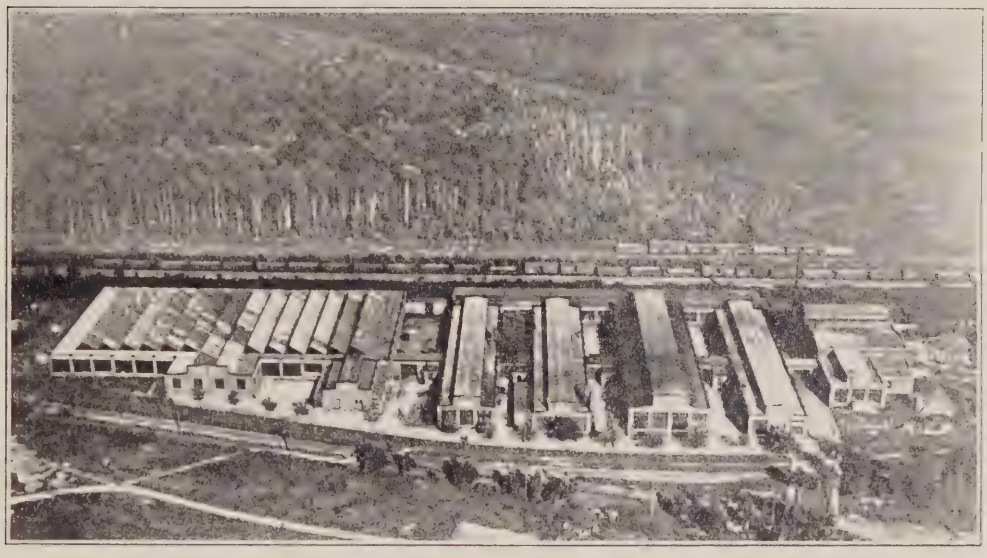
Another branch of service rendered is the installation of new equipment delivered by the Westinghouse Company for use within the surrounding area. Although the Westinghouse Company stopped making automotive equipment several years ago, it has a great many ignition sets, ammeters, etc., still in use, and a repair shop is maintained and parts carried for this line in the Liberty Street building. In the same structure also is quartered a sales force engaged in selling industrial and power station equipment, in the surrounding region.

H. G. Lewis is in general charge of the Liberty Street service establishment. A. P. McLellan is superintendent of electrical maintenance, and P. C. Paranoff is superintendent of automotive equipment repairs.

THE ADVENT OF ROLLS-ROYCE, OF AMERICA, INC.

In November, 1919, Rolls-Royce of America, Inc., was organized, and produced its first chassis in January, 1921.

The parent concern in England found during the period of the World War that the demand for its Rolls-Royce aircraft engine was so great that in 1917 American automobile builders were asked to contribute to Rolls-Royce production abroad with their equipment and personnel, which they gave until the end of the war. This action resulted in the officers of the English corporation deciding to incorporate in the United States. Representatives of the parent concern came to this country, made a careful survey of manufacturing facilities, and ultimately determined upon Springfield as the city where production should be undertaken. The constant supply of skilled machinists available in the Connecticut Valley, the easy access to drop forgings in the territory between Worcester and Philadelphia, the center of the market for the consumption of the products in New York, Boston, and along the Atlantic seaboard and the housing facilities for employees at reasonable rentals for the fifty-three selected supervisors who were brought to Springfield, from the English plant, more than forty of whom were married men with families, were some of the



ROLLS ROYCE OF AMERICA, INC., SPRINGFIELD

major factors in reaching the decision that Springfield was the place where the American plant should be located.

Following the plan of the parent company it was the original intention of the executives to specialize on chassis exclusively, but the demands made on the new corporation were such as to lead to the early establishment of a coach-works division, with a separate and distinct organization of specialists, for the designing, building and installation of fine bodies.

The location of Rolls-Royce of America, Inc., in Springfield serves as a typical example of the transition that has taken place in industrial Massachusetts. Many plants of seventy-five, fifty or even twenty-five years ago, whose products were then essential to life ultimately became obsolete as customs changed in the progress of civilization, and vanished only to be succeeded by a host of new and larger industries to take their places. As the shrewd Yankee manufacturers of half or a quarter of a century ago had no conception of the automobile and the radio, so the

industrial engineers of today cannot predict what science and invention will produce a few years hence.

How unerringly the writer of a recent public announcement, made by this progressive industrial unit,—The Rolls-Royce of America, Inc., emphasizes the truth of the manufacturing situation in that community:-

"In the swift ebb and flow of tides of business too often do the tyro captains of finance wreck their golden argosies on the shoals of inexperience of planning solely for the future without profiting by lessons of the past—while others, dwelling continually in the past fail to take bearings by the brilliant lode star of Progress and ultimately founder within a Sargossa of their own creation. Nearly two thousand years ago a Roman philosopher, uttered the cogent warning:

'Follow the golden mean!'

"Progress to be lasting must be built upon the bedrock foundation of knowledge, integrity and idealism—the trinity of the golden mean. Seventy-five years ago, the wise fore-fathers of Springfield envisioned but dimly the glories of present-day achievement, yet the progress of the city of their incorporation knew no retrogression, because while applying the lessons of the past they made ample provision for the future. Civic spirit thus engendered finds its reflection today in the outstanding success of many mills, factories and work-shops of international reputation.

"In 1919, Springfield was chosen for the works of Rolls-Royce of America, Inc., only after the most meticulous country-wide survey. In addition to being the city freest from labor troubles in the United States, the artisans of Springfield—from long experience in fine precision work—were found to possess the same pride in workmanship as the craftsmen of England. Rolls-Royce officials have never once regretted entrusting Rolls-Royce reputation to the loyal workers of Springfield, since with each succeeding year new lustre has been added to it.

"The 'New Phantom' Rolls-Royce has ushered in a new era in transportation. If one of the original incorporators of Springfield had recorded such a vision of silent effortless ease among his prophecies for the future he doubtless would have been laughed to scorn. Yet the same journey which took him from sunrise to sunset to accomplish in the family 'carry-all' may now be made in less than an hour in the 'New Phantom' over boulevards second to none in the world!"

More human labor, more minute attention to the principles of precision workmanship and a stricter regard to the elements of beauty and refinements of finish enter into the making of a Rolls-Royce car than perhaps are employed in any other Springfield product. Production of an automobile by the Rolls-Royce works is a matter of much greater lapse of time than intervenes between the placing of the order and the delivery of the car.

The knowledge and experience of the ages were involved in standards attained in the manufacture of the earliest Rolls-Royce cars in England. These standards, further elevated by engineering research and experience have been applied at the East Springfield works with the same success as in England, thanks to the ability to command in this field the high-grade skilled labor measuring up to requirements. The first blow struck in Gen. George Washington's little arsenal on Armory Hill in Revolutionary times started the course of development that has brought and is still bringing to Springfield industries that make quality of workmanship their first raison d'etre.

It is in the design and finish of the body that the quality standards of

the Springfield-made Rolls-Royce car are most forcibly impressed upon the observer. Traditions of the early English coach builders, whose craft meant the same in their field as that of Sheraton or Chippendale meant to furniture, survive in these twentieth century examples of the coach builder's art. The influence of the early American builders and the early makers of lamps and fine coach hardware, here and abroad, is reflected in the product. Similarly, the art represented by exquisitely finished leathers and broadcloths used in the interior of the car speaks of the influence of time.

A dozen or more distinct models of closed cars are now being manufactured by Rolls-Royce of America, Inc. These in turn are subject to an endless process of variation and special innovations to suit the taste of the purchaser. In passing through the coach works division one sees the coach built up, piece by piece, and put through all the stages requisite to its surpassing beauty and utility. Even the bare wood frames reveal to the practised eye the symmetrical lines of the finished car. There is scarcely a straight stick in their composition. These frames are of ash, kiln-dried for the purpose and are fastened to the wood base by a special locked joint and are heavily braced with steel or bronze.

After the wood frames are set up the metal panels and door and window frames are put on. These are of cast aluminum, a metal lighter than steel, immune from rust and well suited to resist bumps. In attaching them to the wood, screws are put in from the inside. There are no nail or screw heads on the outer surface and no exposed fastenings of any kind. The window channel is of special design, being lined with mohair having a long nap thus securing freedom from rattles.

Manufacture of the steel fender is confined to one piece, cut to pattern from sheet stock of heavy gauge. Unlike the ordinary automobile fender, the Rolls-Royce fender is fashioned by hand in the same manner that the coppersmith does his work. It is put on a special form and crimped, first with a power hammer and then by hand, to produce the desired shape and strength, a process calling for skilled and careful workmanship. Each fender is individually fitted to its place, those on the rear of the car varying to suit the body design. After being fitted the fender is filed by hand to remove all dents and scratches and give it a smooth surface all over. All this takes time, but it is part of the plant policy and one of the factors that make the Rolls-Royce different from other cars. The fender is fastened in place by acetylene spot-welding.

The trimmings are of solid nickel silver rather than plated metal, being cut out of solid sheets and hand soldered to the brass or other metal base. This applies to the lamp fixtures, hood hinges, windshield frames and radiator shutters, while the door handles are made of cast nickel silver.

Wood trim for the inside of the bodies is all specially selected stock of the first grade. A variety of woods, such as mahogany, oak, walnut, teak and other kinds distinguished for beauty and permanence, are employed for this purpose and used in accordance with the owner's taste and the particular color and style of his car. Textiles and leather used for the upholstery and interior trim are employed in similar wide variety. Broadcloths and whipcords of high quality are much used, and pleated panels lend a note of distinction in some instances. Silk cloth, used among other things for the window shades, must conform to a high standard and withstand the most severe test under a strong light. The company pays the greatest possible attention to the question of color harmony. Much of

the textile material is manufactured in nearby Massachusetts mills. This is true of the cloth and also the floor carpetings.

The most exact standards obtain in the leather for the inside trim, and the range is from a kid-glove finish to heavy landau leather that will resist the elements. No imitation leather is used. Many styles of grain finish as well as colors are represented in the lines.

The foundation of the trim is of uncolored materials, as a protection against stain by wetting. For the upholstery of the seats curled hair, from South American and Australian cattle's tails, is put over the springs, with a layer of down between this and the cloth or leather. The floor is covered with asbestos and cork, giving insulation against noise and heat.

The paint process starts immediately after the metal body parts have been attached to the wood frame and on nearly fifty per cent of Rolls-Royce cars lacquer is now being used. The South and desert sections of the country prefer it because it withstands the hot sun and winds better than paint.

As the first departure in the lacquer or enamel process, a prime coat is applied and then a surface coat, after which the surface is putty-glazed and then rubbed smooth with sandpaper. The first ground color is then applied, and following this, a second coat. If a two-tone effect is produced, one portion is masked while the other portion is being sprayed on. If paint is used instead of lacquer, five surface coats are laid on in succession, following the priming and putty-glazing. The surface is then rubbed with felt and ground pumice and from two to four color coats are applied. Next come the varnish applications, three coats being applied in succession, the surface being rubbed with pumice after each application. After these comes a final varnish coat, preceded by the ornamental striping which is applied by hand. Gold or silver leaf or paint is used for this purpose. Between twenty and thirty processes are involved in painting a coach in the old-fashioned way, which involves ten times as much rubbing and surfacing as by the lacquer process.

The varnishing takes place in a special room, which is dust and weather-proof and temperature controlled. The ceiling is sprayed and kept free from dust by the use of a vacuum cleaner. The floor is sprinkled every day for the same purpose and the windows are screened against insects. Double windows are provided for winter use and a special ventilating system is operated.

Following its manufacture in the East Springfield works, the chassis is set up and driven to the coach works where the fenders are installed, and then the car goes to the paint shop. After the third varnish rubbing the coach is mounted on the chassis and the two receive the final finish together. The conditioning of the car, including the wiring, installing of the lamps, instruments, interior hardware, plate glass, etc., follows the varnishing work. When these fittings have been added the car is driven out for a final test, is later returned for a thorough cleaning, and is then ready for delivery to the sales establishment or to the individual customer.

Altogether the production of a Rolls-Royce body involves the activities of a dozen or more separate departments, with frequent inspections in each as the work progresses, all the way from raw material to the finished product. After the final assembly of all the parts the car receives a first inspection and before it leaves the works there is a final inspection.

Closed cars made in the Rolls-Royce establishment range from approximately $13,000 upward. Several have been built of late priced close to $20,000.

There is an interesting phase of Rolls-Royce manufacturing activities concerning which little or nothing is known. Through its subsidiary, Brewster & Co., of Long Island City, N. Y., the well-known coach builders, Rolls-Royce has been doing a substantial aircraft business. It is supplying to the United States Navy practically all of the floats and pontoons used on government hydroplanes and amphibian planes, and produced nearly $1,000,000 of such material in 1928, and at the beginning of 1929 the company had unfilled orders for more than $500,000 of aircraft parts.

H. J. Fuller is president, W. E. Hosac and William Brewster, vice presidents, H. C. Beaver, vice president and treasurer, and J. J. McManus, secretary of the corporation, which has $3,500,000 of $100 par value preferred and 35,000 shares of no par common stock. Fourteen hundred operatives are employed by the concern.

THE W. A. LIESON COMPANY

In 1919, W. A. Lieson established the W. A. Lieson Company, with its office in the Third National Bank Building, and the following year removal was made to 73 Taylor Street. In 1922 Joseph R. Spencer entered the concern, became its treasurer and assumed charge of the plant organization. Upon the death of the founder in 1928, Mr. Spencer was chosen president as well as treasurer. F. H. Connell is sales manager and O. B. Parsons is superintendent. In 1929 the company removed to new quarters at 10 Broadway, where it occupies the eastern half of the fourth floor.

It manufactures loose-leaf accounting records and manifold books, and operates printing, ruling and binding departments. The new location gives the enterprise needed room for the expansion of its production of records and stationery for the use of banks, offices and manufacturers, and also for the display of its line of office equipment, filing supplies and card systems, which it has taken on as a distributor.

Card index records constitute a rapidly growing line with this concern, and the volume of advertising printing is being increased.

In 1929 a high-speed automatic press, five additional 100-galley type cabinets, a high-speed automatic card-ruling machine and a rotary card-cutter were added to the equipment.

THE MASSASOIT ENGRAVING COMPANY

In 1919 the Massasoit Engraving Company was formed to succeed Messrs. Copeland & Dodge, and the following year the plant was enlarged. In 1929 it acquired at 77 Worthington Street additional space which gave it 6,000 square feet in lieu of the 3,000 square feet previously occupied. New equipment was installed consisting of a process color camera, a new etching machine, a new proving press, a routing machine and a saw cabinet. The company's business has quadrupled in ten years. Henry Plate is president and Ector F. Rosati is treasurer.

SOME ENTERPRISES OF THIS DECADE

In 1920, Olaf A. Christenson organized the New Edge Tool & Machine Company, to produce machines and machine tools, and became president of the concern. John J. Bagley is treasurer and vice president, and O. N. Christenson, secretary.

From a modest beginning in 1920, the General Photo-Engraving Company, has expanded rapidly until it now ranks as one of the representative concerns of its kind, in New England. By building up an organization of highly skilled craftsmen, particularly proficient in color reproduction,

and by the acquisition of the most modern equipment obtainable, the company anticipated the present demand for multi-colored illustrations and caters to the most exacting requirements of the trade. The operations of the company embrace every phase of photo-engraving, from simple line etchings and half-tone engravings to the most difficult color process and highlight half tone reproductions.

William O. Cohn is president and art supervisor, Philip A. Sherman is director of sales promotion, George C. Kenyon is supervisor of production and Walter L. Clark is treasurer and manager. The corporation has capital of $50,000.

Recent additions to the equipment include a powered copper-etching machine, a large Levy camera especially adapted for color process reproduction and a semi-automatic proving machine, and the management is now experimenting with an electrical etching machine and a highlight photographic process that have recently been placed upon the market.

THE SPRINGFIELD BRONZE COMPANY

In 1920 the Springfield Bronze Company began operations in a small building, in Charles Street, which it outgrew within two years, and to which it made two substantial additions. In 1926 a larger factory was purchased, on Page Boulevard, which, with the Charles Street plant, has operated at capacity ever since in the production of high-grade bronze and aluminum castings. A large volume of business is done for various branches of the aircraft industry, and within the past year the local concern has developed several new bronze and aluminum alloys particularly adapted to aircraft production, which have been so well received by the trade as to call for further expansion in plant area and equipment. In 1929 a substantial addition was built to the company's East Springfield plant, in which new core ovens were installed.

Joseph R. Gould is president, J. C. Tarbell, treasurer, and the board of directors include these two officers and Charles R. Hare. The corporation has capital of $50,000, and employs 120 operatives.

THE DIAMOND MATCH COMPANY

The Springfield plant of The Diamond Match Company was constructed and placed in operation, in 1921, and it is here that this great corporation manufactures its famous matches, that are marketed in book form.

Only ten years before the Springfield unit was started, W. A. Fairburn, a trained mechanical and chemical engineer, had become associated with The Diamond Match Co., and had revolutionized American match-making by utilizing the discarded sesqui patent, which the Diamond concern owned, and had placed it in operation without any changes in match machinery and with no perceptible increase in production costs.

By this time Congress, state legislatures, and insurance companies were becoming aroused against the use of poisonous phosphorus, and the Esch Bill was introduced into Congress taxing white phosphorus matches out of existence. This brought out the fact that The Diamond Match Company owned the patent covering the only satisfactory substitute for white phosphorus, and alone had the knowledge and ability to use the patent successfully.

To meet the situation, the company in 1911, at the suggestion of President Taft, though it had spent a great deal of money on the process, turned over to the people of the United States, without charge, the patent covering the manufacture of non-poisonous matches, and also gave its

competitors its secret and extremely valuable technical processes and formulae for using these patents in this country.

Acknowledgment of Mr. Fairburn's achievements as a public benefactor in removing a readily accessible poison from the American home, in safeguarding lives and property, and in eliminating the occupational disease in an important industry, was definitely made by the award to The Diamond Match Company and William Armstrong Fairburn, its President, in 1915, of the Louis Livingston Seamon Medal—a sort of American Nobel Prize.

The National Printing Company, established in 1922, now occupies 12,000 square feet of floor space, and its equipment includes high-speed automatic printing presses, monotype machines, and multicolor presses of the most modern type.

George R. Ronaldson is president, and John R. Gerich, treasurer.

In 1923, H. E. Dickerman founded the H. E. Dickerman Manufacturing Company, to produce dies, stampings, jigs, fixtures, and gages, and increasing business made it necessary in 1928 to organize a sales department, which is now in charge of F. C. Parker, formerly of the Knox Motors Company.

In 1923 the Vanadium Alloys Steel Company began business at 240 Plainfield Street, in charge of D. A. Black, and in 1929 its executives reported orders running fifty per cent ahead of the previous year.

THE LE BOEUF FOUNTAIN PEN COMPANY

The Le Boeuf Fountain Pen Company, Inc., now occupies a new and modern brick factory, with basement, which has enabled it to enter upon a new period of progress and prosperity.

Automatic turning machinery and other new equipment have been installed and the individual motor-drive system instituted. An up-to-date shop-lighting system fits the plant admirably to the concern's needs.

The company has recently introduced new desk sets, finished in pyroxylin with shimmering pearl effects in blue, green, lavender or rose colors. Onyx and black and gold sets for men's use are made in larger sizes. A special mechanical improvement has been provided, consisting of a ball and socket device for tipping the pen at any angle or placing it at a horizontal position, to suit convenience when the pen is not in use or in closing down a rolltop desk. The same pyroxylin effects characterize the new line of fountain pens to be carried on the person, and also a line of pencils with bright metal trimmings, designed especially for women's use.

The new line of pens has an improved filling system, eliminating the lever in long familiar use and substituting an arrangement by which a slight pressure of the thumb makes way for the instantaneous intake of ink.

In 1929 the company doubled its New England sales force and retained additional salesmen in the central west, the Rocky Mountain states, and the south.

Capitalized for $100,000, the corporation employs seventy-five operatives. Frank T. Walsh is president, William F. Donoghue, vice president, Francis M. Spenkoch, secretary, and John J. Byrnes, treasurer.

THE CUTLER-SALEEBY COMPANY

The Cutler-Saleeby Company, which began operations in 1923, with 1,500 square feet of space, a single box machine and four women employees, purchased in 1928, a three-story factory and adjacent buildings

formerly used by the Blake Manufacturing Company, and owned by the National Papeterie Company, and now employs 100 hands in the production of paper boxes and cardboard containers for games.

The partnership form of operation was maintained until January 2, 1928, when the concern was incorporated with $25,000 of preferred and 1,500 shares of no par value common stock.

The same year the Cutler-Saleeby Company purchased the assets of the Springfield Paper Box Company, Inc., and enlarged its plant to provide space for the various lines produced by the two concerns. The Springfield Paper Box Company for many years has been known for its high-grade fancy paper boxes for hosiery, gloves, jewelry and other merchandise, many of them beautifully lined while having richly ornamental exteriors. The Cutler-Saleeby Company specializes largely in games and has sold this product extensively through chain stores. The individuality of the two concerns has been preserved, each addressing itself to its own field and constituency, while placing the facilities of the combined mechanical establishment at the service of each organization.

Having added two buildings on Quincy Street to its adjacent plant on Tyler Street, one, the two-story manufacturing building formerly used by the Manchester Romper Company and the Blake Manufacturing Company, and the other, a small one-story storage structure, the management of the two companies built a bridge to connect the establishments at the first and second stories.

In 1929 it added 10,000 square feet of floor space by taking over two floors of the former National Papeterie Company plant, and as part of its expansion program it acquired the machinery, stock and materials of Day-Craft, Inc., of Springfield. With the advantage of modern machinery recently installed by Cutler-Saleeby, the management is in a favorable position to continue and expand the paper box business on an efficient basis.

The Springfield Paper Box Company is among the oldest local concerns in its line and has an established trade in various parts of the country.

Charles L. Cutler is now president and Elias M. Saleeby treasurer of the company and holding offices in the reverse order, are the principals of the Cutler-Saleeby Company.

The manufacture of printed cardboard games by the latter concern has been expanded rapidly in the last few years. Several new games are added each year, one of the latest being "Sky High" and more than 1,000,000 games in the various numbers were sold by the concern in 1928.

THE BUS STRUCTURE COMPANY

The Bus Structure Company, formed in 1925, has rapidly extended its production, due to heavy investments in central power stations and sub-stations of electric companies throughout the country.

The idea of developing a system of assembled steel forms for pouring concrete for bus structures originated with H. A. Moody, hydraulic engineer of the Turners Falls Power & Electric Company of Turners Falls. The first construction by this method was at the Chicopee sub-station of the company, and the results were so satisfactory that the Bus Structure Company was formed and is carried on by two sons, Clement W., and Russell F. Moody.

One of its largest jobs was at the enlarged river plant of the United Electric Light Company in Springfield in 1927, where forms were set up

for the pouring of 115 cubic yards of concrete. At the Turners Falls company's Aldenville plant 180 cubic yards were poured. Jobs have been done recently by the company in Muskegon, Mich., and Portland, Me. The company's business in 1928 showed a 100 per cent increase over the previous years. Continuous gains are forecast due to the great expansion of electrical power service in various territories.

No direct competition is met with by the concern in its special line, though there is considerable rivalry as between concrete and other materials employed in the construction of the bus structures. Besides brick and concrete, asbestos lumber is used for the purpose, and considerable research and experimentation is being carried on to develop a lighter material, similar to concrete to fulfill the requirements. At present the concrete structure is favored for the most part, and to give the desired superiority of finish a rich mixture of the concrete is employed.

A new warehouse has been built by the company, with railway track facilities.

Thompson Specialties, Inc., which began the manufacture of a few automobile specialties in 1925, so broadened its line of production that before the end of the third year of operation it was making upwards of forty items.

With an energetic sales program, which showed an increase of 52 per cent in 1927, over the previous year, and a 78 per cent increase in 1928 over 1927, and with export sales booming, the company projected in 1928 the erection of a new three-story brick factory building adjacent to its regular plant.

From the start this concern has been enabled to record a continuous increase of business. Initial sales led to repeat orders and the volume of production grew on the strength of the popularity of the goods. Rapid increase in the volume of new business, however, was due directly to a merchandising plan embodying close coöperation of the manufacturer with upwards of 250 distributors in covering territories. Forty-one traveling representatives are engaged in the foreign fields alone. The company has capital of $60,000, and employs seventy-five operatives. H. C. Thompson is president and C. R. Seltzer, treasurer and secretary.

THE HARRIS SILK HOSIERY COMPANY

Through the efforts of the Springfield Chamber of Commerce the Harris Silk Hosiery Company was brought to the city in 1927, and was incorporated that year, with capital of $227,000, for the manufacture of women's full-fashioned silk hosiery. Production began October 3, 1927, with upwards of 100 operatives employed. Twenty machines, with a capacity of 800 dozen pairs a week, constituted the original equipment, but the present plans call for the erection of three additional buildings, and the installation of one hundred machines.

E. G. Harris is president, J. M. Williams, vice president and secretary, and M. H. Chase, treasurer.

The Malone Knitting Company, engaged in the production of infants' underwear is another recent textile acquisition. E. T. Malone is president and treasurer, and seventy-five hands are employed.

The Sterling Textile Company, of which M. F. Leggett is president, and Alexander Beebe, treasurer, is engaged in the manufacture of cotton and woolen raw stock and yarns for the knitting and other trades.

In 1927, the Palmer Steel Company, was obliged to seek larger factory facilities, due to the receipt of large orders for steel, many of which ran

into thousands of tons. The company that year equipped a new draughting room containing 3,600 square feet of space, lighted by twenty-three large windows.

The corporation has capital of $285,000, employs 150 hands and its officers are: president, Earl Palmer, vice president, A. Charles Waghorne, secretary, Joseph Hartnett, and treasurer, Wayne F. Palmer.

BUXTON, INC.

Any Massachusetts manufacturer who entertains the opinion that national advertising does not pay, when coupled with managerial ability which enables a producing concern to serve the potential market and offer a commodity which the public demands, should consult the officers of Buxton, Inc. Its 1928 advertising campaign was scarcely under way when it was found necessary to operate its plant from July to the end of that year on a twenty-four hour schedule, and even then it was obliged to refuse orders running into many thousands of dollars because of its inability to effect deliveries before the holidays.

Its designing department produced a "Bill-Tainer" which instantly assumed the dominant place in the billfold market, and the sales of this one item resulted in a business during the last six months of 1928 larger than the entire distribution of the entire year of 1927.

The Buxton "Bill-Tainer" which provides separate pockets for large and small bills, and special compartments for cards, licenses and stamps, has the outstanding advantage of being made of a single piece of leather, with no seams to rip and folding only once, with a patented sliding device that prevents cramping and buckling. Two other features contribute to the success of the product. One is a process developed by the concern for splitting leather to a uniform thickness and dyeing and finishing the split surface to meet requirements of appearance and durability, and the other is a process of inserting an ostrich leather panel by vulcanizing, lending a special attraction that has proved a good business-getter. The latter, first introduced with the Buxton products in 1927, is made a feature of some of the new "Bill-Tainers."

The commodities are produced for the export trade in shapes and sizes to fit requirements of the currency of various countries, and export trade in Buxton goods is reported as showing a good increase, principally in the "Key-Tainer" and the "Tobacco-Tainer." Manufacture and distribution of the goods for the European trade is conducted by John Walker & Co., Ltd., of London, which also looks after the business in South Africa and India. South America, Australia, New Zealand, China and Japan are served directly from the Springfield factory.

In 1925, the company erected a new factory, all of which is now filled with up-to-date equipment.

The corporation has capital of $135,324 and employs upwards of 150 operatives. W. R. Buxton is president, Robert S. Kneeland, secretary, and J. G. Buxton, treasurer.

The Hercules Float Works, engaged in manufacturing floats and air chambers, which find world-wide distribution, and owned by Frederick H. and W. A. Engelhard, has recently expanded its activities due to the receipt of large orders from the large oil companies operating in California, Oklahoma, and throughout the southwest, from the United States Government for equipment for naval vessels, and from industrial plants in this and foreign countries.

THE PARAMOUNT SPECIALTY COMPANY

In 1927, the Paramount Specialty Company began the production, at a plant in East Springfield, of 1,000,000 paper napkins and towels per day, which was increased the first of the following year to 3,000,000 a day, requiring seventy-five operatives, on day and night shifts. More than a carload of paper is used each day by the company's folding machinery, which is said to be of a type never before conceived in the industry. The machines fold napkins or towels and count and band them at lightning speed, and the finished product is in a form which is ready for the market.

The company manufactures its paper napkins and towels under a license agreement from the Independent Paper Mills, Inc., of Plattsburg, N. Y., which covers the six New England states.

The East Springfield concern built, in 1928, an enclosed storage and shipping platform adjacent to its B. & A., railroad siding, which provides 12,000 square feet of additional space.

Capitalization was increased that year from $150,000 to $300,000 and another napkin-producing unit was installed, which stepped up production to 6,000,000 towels and napkins each day.

It also added to its equipment an embossing machine, weighing between seven and eight tons, costing $15,000, and which is said to be the largest of its kind in the world, for the production of towels and napkins in embossed designs. P. H. Horwitt is president and treasurer, J. Poole, vice president, and J. K. Dexter, secretary.

In 1928, the Girard Photo Company, which operates plants in Holyoke and Chicopee Falls, opened a third unit, in Springfield, which at the outset afforded employment to 100 operatives, and since that time the total has been increased to two hundred.

In 1928, another new Springfield unit, created because of the demand for radio apparatus—the F. W. Sickles Company, Inc.—evolved a new intensifier, built without tubes or batteries, and designed for attachment to a receiver set, which is said to double, and in some cases, more than double, the volume of sound transmitted from distant stations.

In 1929, when the Victor Corporation undertook the manufacture of its own line of radio sets, it arranged with the Sickles concern to produce at the outset 4,000 a day, which total was increased in May, of that year, to 8,000 a day. Recently the company has been operating a night shift half the size of the day force, and now employs 150 operatives.

One of the means used to increase production is the application of a new rapid coil winder specially designed by F. W. Sickles for the Victor, and also a new threading machine designed by him, which cuts the thread in the tube and also makes the groove that holds the coil in place in the set, through an ingenious arrangement that involves a new method of mounting.

The officers of the Sickles Company are: Roy F. Sickles, president; F. W. Sickles, treasurer, and Mrs. I. L. Blaisdell, secretary.

On October 1, 1928, the Springfield Photo Mount Company acquired by purchase the plant formerly owned by the Frazer Bedding Company, consisting of a three-story brick building, containing 28,000 square feet of floor space, all of which is occupied by the concern, enabling it to more than double its former capacity.

The products include class books, autograph and photograph albums, photograph mounts, desk pads and scrap books. In addition to the old-established lines the company has recently introduced a number of pat-

ented novelties including an automatic bridge score and a new type of desk pad.

Within the last few months considerable new equipment has been added, including automatic printing presses and drill presses, and the shipping room has been reorganized in the interest of greater efficiency. The concern sells extensively through the large mail order establishments and chain stores as well as department and stationery stores.

The officers are William Shaine, president and treasurer, and Jennie and Samuel Shane, directors, and more than seventy-five operatives are employed.

THE THERMATROL MANUFACTURING COMPANY

Recognizing the immense field opened by the rapidly expanding radio market, the Thermatrol Manufacturing Company developed and put on the market, in 1928, the first numbers of a comprehensive rounded line of radio parts and accessories, including a voltage control for protection of radio tubes, having several unique features, and which quickly obtained national distribution. This was followed by a radio lightning arrester, and later by an automatic control for dynamic speakers. A number of additional items are planned, including several which will be marketed direct to manufacturers of radio sets.

In 1929 the company developed and placed on the market a line of noise eliminators to protect the owners of radio sets, known to the trade as Filtrol, consisting of condensers and choke coils in a metal housing with crystalling lacquer finish, which is plugged ahead of a radio set and filters out noises coming over an alternating line, such as sounds from motors and generators, loose connections, elevators, sign flashers or other electrical devices in the vicinity.

Another device developed by the company is called the Motor Filtrol and is designed for direct application to oil burners and other interfering apparatus. It is built to be wired into either direct or alternating circuits and is designed to be used for motors up to one-half horse-power. Still another and much smaller device is the Filtrol, Jr., which plugs ahead of household appliances such as sewing machines, vacuum cleaners, electric fans, and so on, and eliminates interference with radio conception.

The concern also manufactures the Little Gem radio speaker. It materially augmented its employment force in 1929, and its fall production that year was three times that of 1928.

F. M. Johnson, president and chief engineer, and H. W. Case, treasurer and business manager, were formerly connected with the Alden Manufacturing Company. The company has representatives covering all sections of the United States and has recently entered the export field.

In addition to radio products, the company carries on its regular line of temperature regulators.

In 1928, the K. Miller Tool & Manufacturing Company installed a quantity of new machinery in its plant, and occupied 2,525 square feet in the manufacture of a wire cutting and stripping tool, a patented plier, and the Lipe adjustable counter borer for valve seats, while it doubled its equipment of lathes, drills, milling machines and grinders used in the production of small tools. K. T. Miller is president and treasurer, and J. J. Whitehouse, vice president.

An acquisition to Springfield's industries that has materially added to the city's industrial payrolls was the Manchester Romper Co., which, in 1928, removed its Winsted, Conn., plant to Springfield, where it had

been operating two separate factories, and it also transferred to the latter city the machinery located in a plant formerly located in New York City, the several units employing about 100 workers.

The company had previously removed to Springfield about 75 per cent of the production of its New Haven, Conn., and Trenton, N. J., plants, and ultimately it will concentrate all its manufacturing operations in Springfield. While it had 300 employees on the local payroll in the middle of 1928, this total has since been increased to 800.

THE HANDY CHAIR & TABLE COMPANY

In 1928, the Handy Chair & Table Company was incorporated, to take over the plant and business of the H. L. Handy Chair & Table Company, which was formed in 1919.

With ample capital at its disposal, the new corporation extended its operations to the field of hotel and restaurant furnishings. H. L. Bancroft, for six years manager of the old corporation, was elected president and treasurer of the new organization, and Parmly Hanford, vice president.

Two auxiliary plants, one in New York State for the manufacture of folding wooden chairs, and another in Illinois for the production of metal parts are operated by the new concern. Some of the products made in the out-of-town plants are brought to Springfield to be assembled for the New England trade. With the scope of production thus broadened, and following the installation of new machinery permitting speedier production, the company has increased its working force from thirty-five to sixty men.

SOME LOCAL CONCERNS ESTABLISHED IN 1928 AND 1929

In 1928, the Clark Paint & Varnish Company started production in the factory formerly occupied by the Perkins Machine & Gear Company, and markets its products in bulk lots, mostly by the barrel, the railroads, municipalities and manufacturing industries being among its large users. Fred B. Clark is president and treasurer, and Archer R. Simpson, is secretary.

The Springfield Metal Stamping & Tool Company of Springfield, was incorporated in 1928, with $25,000 capital, to manufacture electrical conduit boxes, which are made in large quantities for leading electrical concerns. A night force has been operated for some time past.

In 1928, the J. Brook Company, Inc., leased 4,000 square feet of manufacturing space in Springfield and began the manufacture of house dresses and aprons.

The Auto Smock & Clamp Company was established, in 1928, to manufacture a line of coverings and fastenings for the protection of automobile upholstery when cars are being serviced and repaired in garages. The use of a special brand of paper is regarded as marking a great improvement over any material in use for the purpose. When fastened to the backs and cushions of the car by means of clamps and straps this covering has the advantage of making no sound due to the motion of the car or the movements of the driver while the workings of the mechanism are being tested, and it has the further merit of remaining securely in its place and is practically impervious to grease and dirt. The insides of the doors and even the steering wheel may be encased in these covers.

Paper for the smocks is manufactured in Framingham, and the clamps are made by the L. D. Van Valkenburg Company of Holyoke. The device

has been adopted by several garages and service stations in this section. Charles F. Berry is president and B. T. Berry, treasurer.

Springfield has a concern that turns out every twenty-four hours 500,000 cones, or at the rate of three million a week. Production is carried on night and day on a systematic basis at the plant of the Atlantic Cone Company, and cones are shipped to various Atlantic seaboard cities, as far south as Florida. The volume of output is said to be running 30 per cent ahead of 1927, and the full capacity of the local plant, with its 16,000 square feet of floor space is now utilized. Plans for expansion have been formulated which call for a further increase of 50 per cent in production, beginning January 1, 1929.

The concern was originally located in Boston, but when its plant there was destroyed by fire it removed to Springfield. It is one of thirty-five branch establishments of the McLaren Consolidated Cone Company, a $35,000,000 concern, with home offices in Dayton, O.

The Tewaldi Supply Company completed, at Indian Orchard, in 1928, a new plant to take the place of the one destroyed by fire, which is capable of a daily production of 10,000 concrete blocks or tiles, or 30,000 concrete brick, as the current market demands. The plant as it stands is among the most modern in the country with five machines for casting the units, 200 new steel cars for handling the product, new conveyors for moving the sand, new elevators to move the cement and a new traveling hoist. The fact that the huge volume of sand rises to a height of sixty feet in the rear of the plant reduces operating costs. More storage space has been provided for the new plant, which occupies virtually the same site as the old, with improved arrangements.

The Ted Shea Oar Company came into being in 1928, when Timothy H. Shea, who soon after the close of the World War sold his former industry to an out-of-the-state concern, formed a new corporation, and began the manufacture of spruce oars for the United States Naval Academy, and various college crews.

The Munder Electrical Company, of which Robert V., and Rushworth I. Munder, and Leland W. Gilliott, are the principal executives, is one of the city's new concerns, and now utilizes 10,000 square feet of floor space, in the production of 1,000 radio tubes per day, and 6,000 infra-red ray lamps per week.

The subject of television is being studied by the Company's engineers, with a serious view to entering this field in the near future.

In 1929 the concern maintained a production of between 6,000 and 7,000 tubes a day, and placed upon the market its new infra-red ray lamp. It also enlarged its plant facilities on the fourth floor of the former National Papeterie Company's factory, and now employs fifty operatives. Robert V. Munder is president, Leland W. Gilliatt, secretary and Rushworth I. Munder, treasurer.

In 1928, the Fleischmann Company occupied its new branch factory, 83 by 71 feet, equipped with an automatic refrigeration plant, the Springfield unit serving that city, Holyoke, Chicopee, Westfield, West Springfield, and other vicinity territory. Yeast is brought daily in the company's trucks from the main plant in Peekskill, N. Y.

Glaz, Inc., engaged in manufacturing "Glaz"—a preparation for the rapid cleaning of windows, door panels, and other glass installations, developed, in 1928, a new product called "X-Rayn," designed to provide clear-vision windshields during rain storms, and manufactured from a

secret formula which was perfected after extended study and experimentation.

H. M. Phelps is president, Joan Broadhurst, treasurer, Dr. D. J. Foley, secretary, and Gerald Dean, chemist and research director, of the corporation, which has capital of $50,000.

The E. J. Kerns Company, of which Edward J. Kerns, Jr., is owner and manager, recently began the manufacture of athletic equipment, including rowing and sculling machines, and a general line of boat fittings, and numbers among its customers the United States Naval Academy, the universities of Yale, Pennsylvania and Washington, the Havana Yacht Club, of Havana, Cuba, the New York Athletic Club, and many athletic organizations.

In 1929, the George Weston Biscuit Company, Inc., of Toronto and Montreal, which built a branch plant at Watertown, in 1928, at a cost of $500,000, opened a branch in Springfield, which serves as the distributing point for western Massachusetts.

The Commercial Welding Service, owned by A. V. Napolitan and Harry S. Ferrier, as partners, enlarged its local plant, in 1928, by the addition of a one-story brick structure to the two-story building, in which its oxy-acetylene and electric arc welding operations had been carried on. The concern was not founded until 1925, but it has made a specialty of new and repair work for manufacturing enterprises, in addition to the operations carried on in its factory.

Thomas M. Stuart is president of the Stuart Laundry Machinery Company, which produces, through arrangements with the National Equipment Company, and at the latter's plant, the new National Aero-Dry press for laundries. An automatically controlled fan circulates hot air into the press, fluffing and ballooning the padding, thus bringing the article to be laundered in contact with the heated head of the machine, the moisture being instantly turned to vapor, which is absorbed by the atmosphere, and following the application of pressure sufficient to complete the ironing process a timing device automatically raises the head, thus continuing the aeration of the bed. Hot air is then forced through the padding and drawn back through a vacuum circuit at the periphery, removing all moisture from the padding, the process speeding production by from 40 to 50 per cent, and delivering the goods in better condition than when entrusted to other devices, enabling dainty silken or woolen articles to be fluffed and rendering a desirable finish to monograms and stitching.

In 1929 the company placed on the market its new line of laundry presses and expanded into the national field by opening an office in Chicago and another in Canada.

The Precision Cylinder Grinding Company, owned by Richard E. Toelken and Herman M. Polley is engaged in rebuilding and repairing airplane motors.

The Sanitary Ice Corporation, the first artificial ice concern to be established in Springfield, was formed in April, 1929, with capital of $100,000, erected a plant, and installed machinery. George P. Philbower is president and treasurer, George C. Stebbins, vice president, and John H. Madden, secretary of the corporation.

Two New York City corporations moved to Springfield, in 1929—the Bay State Leather Company, manufacturers of pocket-books, and employing 100 hands, and the Spitz Nover Company, producing handbags, and employing 100 operatives, while the Spaulding-Moss Company, of Boston, opened a Springfield branch, the same year.

The Great Atlantic & Pacific Tea Company erected the largest butter printing establishment in the east, in the city, that year, having a capacity of 144 tons of butter a day, or an annual volume of $30,000,000. The unit employs between 75 and 100 operatives.

In 1929, Arthur S. Cann and James M. Morton formed the C. & M. Metal Products Corporation, and began the manufacture of dies and steel and brass stampings in the Potter Building. Frank A. Reedy is president, and Mr. Morton vice president and treasurer of the concern, which has capital of $200,000.

Upwards of 5,000 square feet of manufacturing space are utilized in the production of steel covers for electric outlets and steel tote pans for factory use. The concern has increased its output for electric outlet covers from 150,000 to 250,000 a month, and its production of tote pans from 8,000 to 15,000 each month.

The Country Club Soda Company is one of the city's fast growing enterprises, and in 1929 it installed much new equipment, including a syrup filter of an improved type, a labeling machine that affixes the labels and gold foil covering the cap and top portion of the bottles, and a new bottling machine of large size, duplicating one previously in use, while seven trucks were added to its fleet, that year. A new line of true fruit carbonated beverages was added the same year. Additional warehouse facilities were provided in 1929 by the acquisition of realty on Holyoke Street, and a new building is projected at this location. Distribution of the company's products is made as far west as Buffalo, N. Y., and in New Jersey and Pennsylvania. The corporation has capital of $75,000 and employs fifty operatives. M. Katz is president, M. Katz, vice president, Louis Katz, treasurer and Herman A. Katz, secretary.

In 1929 the Century Manufacturing Company installed additional machinery to take care of increased orders for hospital suits, garagemen's coats and other special garments supplementing the line of white duck products manufactured by the concern.

Class uniforms for commencements, butchers' frocks and uniforms for factory workers are produced in large quantities.

The Ornamental Iron Shop increased its manufacturing space in 1929 and added considerably to its equipment that year. It manufactures a diversified line of wrought iron products for the exteriors and interiors of residences and other buildings, and produces structural iron commodities, fire escapes, elevator frames, heavy hinges for fire station and factory doors, laundry chutes, stair and porch railings, lanterns, fireplace sets and screens, radiator wasps and fancy quilles.

The concern was founded by W. P. Clark, and is now owned by F. G. Guthrie.

In 1929 William Cloutier removed his machinery business from Attleboro to Springfield, leasing manufacturing space on the second floor of the Smith Carriage Company's building, on Park Street, where machine and tool work is executed and where metal stampings are manufactured.

Operations include production work on turret lathes, experimental work on special machines and jobbing work. Manufacture of tools for the Attleboro jewelry concerns constitutes one of the lines, and some of the large iron foundries of southern New England are carried as customers.

A new corporation has been formed to carry on the business in Springfield, which was conducted in Attleboro as the Cambec Tool & Stamping Company. Along with its other activities, the concern manufactures the Cambec fire extinguisher.

THE BALANSTAT CORPORATION

In 1929, increased production of the Balanstat, a new temperature regulating device, manufactured by The Balanstat Corporation, began with the installation of equipment whereby most of the parts were fabricated of pressed, instead of cast metal. The company arranged that year with the Porter-McLeod Machine Tool Company of Hatfield, to manufacture 1,200 of the devices at that plant.

The Balanstat Corporation was not organized until October, 1928, and early the following year it was acquired by the Anthracite Operators' Conference, of New York City, which is now marketing the device through retail anthracite dealers throughout the country. It is planned to establish production on a basis to take care of national sales.

Since World War days the conservation of fuel has received increased attention and the anthracite producers have conducted systematic research and circulated literature to aid the consumer in getting more for his money, and also in reducing the amount of time and manual labor attendant upon running a furnace and boiler. Better combustion makes the coal supply go further and gives better all-around results, and the use of an efficient device for temperature regulation is adjudged of great value in providing satisfactory service.

That influences have been set to work that will bring large benefits in respect to greater comfort, convenience, labor-saving and economy for anthracite users is the view of well informed observers.

The Balanstat is a departure from the types of thermostat previously in use, giving the alternative between an open and closed draft, with a tendency to produce too vigorous combustion, on the one hand, or a sluggish and dying fire, on the other. The new device operates the dampers by maintaining them in a balanced position, causing the fire to burn steadily and preserve a uniform temperature in the rooms. This balance is obtained from the action of gases expanded from liquid chemicals, after the same principle employed in electric refrigeration.

A thermostat is located in one of the rooms of the home and a diaphragm and lever arrangement in the cellar. The room thermostat is a bulb or medallion partially filled with a volatile liquid which is sensitive to temperature changes. This liquid rides on a heavier brine that fills the lower part of the medallion. A tube, which is also filled with the brine, connects the medallion with a diaphragm bellows. As the gas pressure in the medallion increases with rising temperature, the brine is forced against the diaphragm and actuates the lever, which in turn closes the ashpit damper and opens the check damper. When the temperature of the room in which the medallion is placed drops, the gases in the medallion are cooled and contract, and the action on the lever is reversed so that the ashpit door is opened and the check damper closed.

The range of temperatures through which the Balanstat operates is from 60 to 85 deg. Fahrenheit, and the weight on the lever arm in the basement is set so that the indicator points to the temperature desired in the upper rooms. There is no clock or timing device used, as it is intended to maintain a uniform temperature throughout the twenty-four hours of the day. This eliminates clinker trouble resulting from forcing the fire during the early morning hours. In the case of steam there is no alternate rise and fall of pressure, and where the air valves are located on the radiators there is an absence of noise due to inrushing or expiring air. With hot water systems there is a uniform water temperature. Any var-

iation in the temperature of controlled rooms during the day is said to be so slight as to be unnoticeable to the occupants.

A feature of this thermostatic device is that it is self-operative and uses no springs, batteries or electrical connections. The chemical agent employed for temperature regulation varies according to the amount of pressure desired, depending on the temperature level to be maintained in a given case. In any case the amount of the chemical used would be so small as to involve no element of danger.

The use of such chemical agents in this connection comes as a result of refrigeration knowledge being applied to the thermostatic field. Hazor J. Smith, president of the Balanstat corporation, is the engineer who developed the Coldak refrigeration system. He came to Springfield from Chicago with that invention in 1921 and during recent years he has devoted his attention to problems of heat regulation.

In addition to thermostats for use in home heating, the Balanstat Corporation has developed a system of thermostatic control for unit heaters of the block fin type, used in school buildings and hospitals, and ventilating systems, the devices for which are now coming through their laboratory tests. These devices are not included in the sale to the Anthracite Operators' Conference, and will be taken in hand by a new corporation to be formed for the purpose, as their application does not relate primarily to the use of anthracite. The concern has capital of $50,000, and H. J. Smith is president, H. P. Small, secretary, and George D. Roberts, treasurer.

THE NATIONAL CORDAGE CORPORATION

The National Cordage Corporation was formed in 1929, for the manufacture of sash cord, clothesline, seine lines, mops, awning lines, spinning bands for use in cotton mills, trolley rope and signal cord for street cars and other products of a similar nature. The concern whose factory is at 54 Harrison Avenue, recently acquired the firm known as the National Cordage & Supply Company, which started business early in 1929, and the corporation is now operating on a larger scale. A new spinning frame and twenty new cord braiders have been installed and production has been increased to 140,000 feet of cord daily.

Material comes to the plant in the shape of yarn from the cotton mills and is spun and braided into cord and line of various weights, to meet various requirements. There is a wide market for such goods owing to the diverse applications that can be made of the product, and it is proposed to increase the range of production as the business progresses.

The officers are L. M. Hillard, president; Dr. James P. Hillard, treasurer, and M. P. Brown, secretary. Robert Brown is manager of the plant.

THE SANITARY ICE CORPORATION

In 1929 the Sanitary Ice Corporation began the occupancy of a plant equipped to manufacture sixty to seventy tons of ice a day, and with a storage capacity of 600 tons—the first unit to market manufactured ice in Springfield for many years.

The new corporation uses the city's municipal water supply in producing its commodity.

So pure is the Little River product and so well adapted to drinking purposes that the process of distillation commonly employed in preparing water for the making of ice is not necessary in this instance. No chemical treatment whatsoever is required, the water merely being put through a

quartz filter to remove any foreign matter, such as dust, or particles of bark, that may have been collected.

Approximately 12,000 feet of iron pipe is employed to contain the ammonia gas that induces the freezing process. A motor-driven compressor withdraws ammonia gas having a low pressure from the evaporator coils in the freezing tank and delivers it to the condensers, where it is reduced to a liquid state and returned to the evaporators to absorb heat and be expanded again into gas.

The tops of the cans in which the ice is frozen are protected by wooden covers, one for each group of cans, and these together form a big floor made up of removable sections.

When the freezing of the ice blocks is complete the containers are withdrawn from the tank by a three-ton travelling crane that deposits them in a tank of slightly heated water that loosens the cakes of ice in the containers, so that they slide out readily with the use of a mechanical dumping contrivance. The ice is then conveyed to the adjacent storage room and the cans are refilled with water and returned to the tank.

The plant on Albany Street was built at a cost of $100,000. It is of brick and steel construction. All machinery is operated by electricity. Just outside the building are two transformers which reduce the current from 5,500 to 640 volts. On the roof of the building is a water-cooling system composed of many pipes built into a quadrangular structure. Water is taken from the engines after it has absorbed heat and is pumped to the roof and forced out through spray nozzles, broken into tiny particles and aerated. By this means the temperature is reduced to about half what it was when it left the engines. From a trough on the roof it is returned for use again in cooling the motors. Ordinarily there is enough rain water added to compensate for what is lost by evaporation and otherwise, and the water employed for this purpose is used over and over again.

The product of the Sanitary Ice Corporation is sold through dealers and the operations are conducted on the wholesale basis, except that a retail system is maintained whereby customers can drive to the platform of the plant and buy ice on the cash-and-carry basis.

G. B. Philhower is president and treasurer; George C. Stebbins, vice president, and John H. Madden, secretary.

In 1929 H. K. Moseley, manufacturer of sash, doors and blinds, began the occupancy of a large section of the building of the Arcade Smelting Works, on Page Boulevard, in East Springfield, utilizing all of this property not in use by the Springfield Castings Company.

In 1929, the Perfection Grate & Supply Company, placed upon the market a new heavy-duty-mechanical stoker for use in factories, hospitals, schools and other large establishments using coal as fuel. The officers of the concern are W. L. Cronin, president, and N. J. Hibbard, treasurer and secretary.

SOME OF SPRINGFIELD'S OTHER MANUFACTURES

The Agawam Electric Company, whose headquarters are at 1387 Main Street, Springfield, supplies the town of Agawam, with electricity. George W. Lawrence is president, Fred. C. Abercrombie, treasurer, W. Rodman Peabody, vice president, and Robert W. Mitchell, secretary, of the corporation.

The All Metal Company, owned by Adolph G. Miller, manufactures sheet metal goods, and employs thirty-five operatives.

The American Telegraphone Company, with capital of $5,000,000, is

engaged in the production of telegraphones and universal joints, George V. Curtis being the manager.

The Amherst Brick Company, with capital of $60,000, employs fifty men in its plant, at Amherst, in the manufacture of common building brick, but its main headquarters are at 293 Bridge Street, Springfield, R. W. Upson is president, Charles M. Field, treasurer, and S. B. Field, secretary.

The Barnard Foundry Company employs twenty-five men in producing grey iron, aluminum, brass and white iron castings, the concern being owned by William M. Barnard.

The M. H. Barnett Company, Inc., of which M. H. Barnett is president and treasurer, R. A. Buchan, vice president, and F. C. Cook, secretary, employs 125 men in manufacturing cigars.

The Bay State Tool & Machine Company is engaged in the production of special tools. Alfred Gaudreau is president, Charles Gaudreau, vice president, Leo Gaudreau, secretary, and Richard Gaudreau, treasurer.

The Brown Paper Box Company, Inc., employs twenty-five operatives in the manufacture of paper boxes. The company has capital of $25,000. John F. Lyons is president and R. A. Baldwin, Jr., is treasurer.

The C. & P. Electric Works, Inc., with capital of $50,000 manufactures steel boxes, panels and switchboards. D. R. Curtis is president, and F. C. Curtis, treasurer and secretary.

The H. R. Huntting Company, has capital of $300,000, and employs upwards of 150 operatives in the production of loose leaf binders and supplies, Raymond C. Bidwell is president, Henry H. Huntting, secretary and treasurer, and Vernon M. Schenck, vice president and assistant treasurer of the corporation.

The Potter Knitting Company ranks as one of Springfield's larger textile concerns, employing upwards of 175 operatives in the manufacture of knit goods. The corporation has capital of $471,000. C. B. Potter is president and treasurer, and Samuel M. Green, vice president of the concern.

Leicester Warren is president and treasurer of the Warren Manufacturing Company, which has capital of $200,000 and employs thirty-five operatives in the production of factory trucks and trailers.

The William Carter Company, of Newton Heights operates one of its branch plants in Springfield; the Consolidated Rendering Company, of Boston, maintains one of its six Massachusetts plants in the city; the J. J. Cummings Company, of Boston, operates a local branch, at 1559 Main Street, in carrying on mechanical dentistry; the Dunker & Perkins Company, of Boston, operates a branch at Springfield, where dye-stuffs, textile scouring oils and soaps are manufactured; the plant of the Home City Electrotype Works, Inc., of Boston, is located in Springfield, where sixty hands are employed; the Massachusetts Baking Company of Boston, operates a branch plant in Springfield; one of the Bay State plants of the National Biscuit Company is operated in the city; one of the two Massachusetts plants of the Prest-O-Lite Company, of New York City, is operated in Indian Orchard; The Price & Lee Company, of New Haven, Conn., operates its Massachusetts branch at 1387 Main Street, in Springfield, and the Wetmore Savage Company, of Boston, operates a branch unit in the city.

Donald J. Davitt owns The Davitt Iron Foundry, and employs seventy-five men in fabricating iron castings.

The C. E. Day Lumber Company, of which C. E. Day is president and

treasurer, manufactures box shooks and box bands, the concern having capital of $20,000.

F. E. and B. A. Dewey are engaged in manufacturing paper ruling machines and employ twenty-five operatives.

M. J. Dunn & Company, a partnership which includes Thomas J. Moriarty and J. B. Dunn, manufactures motor truck bodies, and auto tops, and employs thirty operatives. The Eldredge Electrical Corporation of which A. Linton Bausman is president, G. E. Boynton, vice president, and H. C. Hyde, treasurer, manufactures meters, and radio, automobile and electrical apparatus.

The H. F. Elwell Iron Works, owned by H. F. Elwell, are engaged in the production of structural and miscellaneous iron work.

Engel Brothers, a partnership including Charles F., Herman F. and Karl J. Engel, with capital of $10,000, manufacture pocketbooks and fancy leather goods.

The Fleming Foundry Company employs forty men in the production of grey iron castings. E. J. Fleming is president and treasurer, A. E. Cronin, vice president, and E. J. Fleming, Jr., secretary, and the concern has capital of $10,000.

The Foley Paper Company, Inc., of which T. J. Foley is president, C. E. Sloan, secretary, and M. T. Foley, treasurer, manufactures toilet paper and paper towels, and employs twenty-five hands. The company has capital of $30,000.

Foss & Bump, Inc., with capital of $40,000, manufactures leather belting. William J. Foss is president, Dana R. Johnson, secretary, and Charles H. Bump, treasurer.

The Franklin Creameries, Inc., employ 150 operatives in the production of dairy foods. F. D. Tait is president, V. F. Hovey, vice president, and D. W. Fisher, treasurer.

The Frazer Bedding Company, with capital of $30,000, employs thirty hands in the manufacture of bedding. Fred L. Frazer is president and M. B. Barkley is treasurer.

The Hampden Brass Company employs fifty operatives in the production of brass, bronze and aluminum castings. Irving Schoen is president and C. R. Hastings is treasurer and secretary. The corporation has capital of $56,000.

Hastings & Schoen, with capital of $45,000, employ twenty-five men in the production of wood and metal patterns and brass and aluminum castings.

The Lynd-Farquhar Company, with capital of $100,000, manufactures metal working tools. C. S. Farquhar is president and treasurer, H. L. Rich, vice president, and H. F. Furber, secretary.

The M. & W. Co., of which C. F. Munder is president and treasurer, has capital of $200,000, and manufactures incandescent lamps.

McLoughlin Brothers, Inc., with capital of $300,000, employs upwards of 100 operatives in producing juvenile books. Edward O. Clark is president, George A. Fox, secretary, and Robert N. Ingersoll, treasurer.

The Maypole Company, Inc., employs seventy-five hands in the manufacture of children's clothing. H. H. Atherton is president and treasurer, L. B. Atherton, vice president, and Wilder R. Coyle, secretary.

The Metal Saw and Machine Company, Inc., of which Fred T. Ley is president and Howard L. Washburn, treasurer and secretary, manufactures band saws, and employs seventy-five operatives. The corporation has capital of $400,000.

The John A. Murphy Company has capital of $75,000, and employs seventy-five operatives in the production of papeteries. J. L. Pitman is president and treasurer, and R. M. Pitman, secretary.

The National Bronze Company, owned by J. W. Buckley and F. W. Enzenbacher, employs twenty-five operatives in producing bronze, brass and aluminum castings. These two partners also operate the New England Foundry Company, producing cast iron weights and washers.

The New England Card & Paper Co., Inc., of which H. B. Swan is president and D. L. Swan is treasurer, employs thirty-five hands in the manufacture of coated papers. The corporation has capital of $125,000.

The New England Roller Grate Company, with capital of $100,000, employs upwards of 100 operatives in the manufacture of boiler grates. David Hale is president, C. W. Hale, vice president, and James Hale, treasurer and secretary.

Among Springfield's wide diversity of products are handcuffs, which are manufactured by the Peerless Handcuff Company, with capital of $25,000, and of which James Milton Gill is president and M. C. Sheldon, treasurer.

The Perkins Soap Company, with capital of $100,000, is engaged in the production of soap, and has its Boston office at 263 Summer Street. Charles H. Dunker is president, A. T. O'Brien, vice president and secretary, and Eugene C. Perkins, treasurer.

The Safety Wrench & Appliance Co., of which Guy W. Donahue is president, B. S. Siegel, secretary, and William F. Pollock, treasurer, manufactures hopper car wrenches, and has capital of $50,000.

Folding paper boxes are produced by the Sample-Durick Company, Inc., which has capital of $50,000 and employs thirty operatives. William W. Sample is president and treasurer, Henry C. Durick, vice president, and Nelson L. North, Jr., secretary.

Henry Shpetner Sons & Co., Inc., is engaged in the manufacture of ladies hand bags and novelties. The concern has capital of $125,000 and employs seventy-five operatives. Henry Shpetner is president, Thomas Shpetner, vice president, and Sidney Shpetner, treasurer.

The Springfield Dairy Systems, Inc., have their main headquarters in Springfield, but operate branches in Northampton, Greenfield and Hoosick, N. Y. The concern is capitalized for $83,950 and employs seventy-five hands. O. A. Tuttle is president, R. E. Hyde, vice president, H. S. Ashley, clerk, and H. A. Henshaw, treasurer.

The Springfield Lumber Corporation has capital of $100,000, and employs twenty-five operatives in producing lumber of all kinds. Leslie E. Korper is president and Howard B. Field is treasurer and secretary.

W. H. Nevins is proprietor and manager of the Springfield Printing & Binding Co., which employs 125 operatives in the production of calendars, catalogs, and edition work.

Tinsel goods are manufactured by the Springfield Wire and Tinsel Company, which has capital of $135,200. G. E. Tenney, is president, E. S. Bradford, Jr., treasurer, and E. S. Bradford, secretary.

Alfred P. Carroll is the owner of the Stacy Machine Works, which manufactures special machinery.

The Sterling Textile Company, of which Matthew Leggett is president, and Alexander Beebe, treasurer, is engaged in the dyeing of yarns and raw stocks.

Frank F. Storms is president, R. E. Whittle, secretary and R. A. Charpentier, treasurer, of the Storms Drop Forging Company, one of the

city's long established metal working industries, which from its inception, as its name implies, has specialized in drop forgings. The corporation has capital of $550,000 and employs seventy-five operatives.

The Taber Prang Art Company is one of the city's well-known industries, and employs upwards of 100 operatives in the production of high-quality pictures and frames. James L. Acher is president, Col. Benjamin A. Franklin, vice president, and Dwight Gilmore, treasurer and secretary, and the corporation has capital of $550,000.

Michael H. Smith is the owner of the Union Casket Hardware Company and employs thirty-five operatives in the production of hardware for caskets.

Glazed and cloth-faced papers are produced by the United Manufacturing Company, which has capital of $200,000, and which maintains its general offices at 200 Madison Avenue, New York City. Fifty hands are employed. A. S. Guggenheimer is president, Albert P. Tapley, secretary, and Edmund J. Levine, treasurer.

The United Nut Lock Company, with capital of $150,000, is engaged in the manufacture of nut locks, Albert E. Lerche being president, Stuart M. Robson, secretary, and Arthur C. Harvey, treasurer.

Candy and chocolate machines and kettles are produced by the Universal Candy and Chocolate Machinery Company, Inc., which is capitalized for $50,000. John J. Lester is president, O. E. Segrin, vice president, Pearl Bates, secretary, and Otto Johnson, treasurer.

Seventy-five hands are employed in the plant of Van Heusens Home Made Candies, Inc., where confections and ice-cream are manufactured. Edwin L. Brigham is president, Cecil L. Van Heusen, treasurer, and Arlene J. Davis, is secretary of the corporation, which has capital of $50,000.

Joseph Whitcomb & Co., owned by Frank D. Whitcomb, employs 200 operatives in the manufacture of cigars.

The Wright La Montagne Company, with capital of $20,000, employs forty operatives in the production of corsets. Royal V. Wright is president and treasurer, Ivan La Montagne is vice president and F. P. Hubbell is secretary.

The Shepardson Extract Company, whose plant is at 67 Taylor Street, is one of Springfield's growing industries, its sales up to September 1, 1929, having exceeded the total for the calendar year of 1927, with every prospect of the gain being maintained from that period forward. Its principal customers are ice cream and confectionery manufacturing enterprises. The concern is owned by M. A. Shepardson.

In 1929 the City Dye Works remoledel its plant and installed new machinery at a cost of $40,000. Samuel M. Green is president and Winslow Meadows, treasurer and manager of the corporation.

The same year C. H. Martin, who originated the Martin Fifth Wheel and Trailer, invented and placed on the market a new electric exercising machine, designed for installation in gymnasiums, beauty shops, barber shops and hotels, the device having a coin and slot attachment, said to be the first of its kind to be operated on this basis.

A RETROSPECTIVE VIEW OF INDUSTRIAL SPRINGFIELD

Those who observe in the establishing of textile plants in the South and the advent of shoe factories in the Middle West signs of decay in Massachusetts give no heed to the pages of the industrial history of all our cities and towns, which fairly reek with the tales of vanished indus-

tries of all types but whose places have been taken by new and larger manufacturing units.

Springfield, a beehive of diversified production, may be cited as the typical example of a locality where the changing tide of American industrial productivity has left its impress upon the community in a very vivid way. Notable industries of the long ago that are now no more in that city are the Joseph Carew card factory of a hundred years ago; the Springfield Manufacturing Company, which erected the first large cotton and woolen mill on the banks of the Chicopee River, and was capitalized at a million dollars—a big sum at the time; the Springfield Satinet Company; the Springfield Machine Company; the American Hardware Company, producers of furniture casters; the Springfield Sword Manufacturing Company; the Rumrill Gold Chain Manufacturing Company; the Springfield Cork Manufacturing Company; Caleb Alden's woolen factory on Mill River; the Ray & Taylor paper collar factory, the largest of its kind in America; S. S. Burbank's Spectacle Factory, the product of which had a world-wide reputation; the Hampden Watch Company, which at one time employed 300 hands and later moved to Ohio; the Newel Bros. Button Manufacturing Company, the largest unit of its kind in the United States, which entered a merger and was removed to another city; the National Needle Company, a world leader in its class, which also disappeared via the merger route; the Medlicott-Morgan Textile mill; the Fisk Soap Company, whose products enjoyed world-wide sale; the Bay State Corset Company, which employed 600 hands at the height of its prosperity; the Stevens-Duryea and the Knox Automobile concerns, which faded out of the industrial picture; the Barney & Berry Skate Company, which dissolved after the death of its senior partner, and so on down the list.

In the '70s the products manufactured by Ray & Taylor were distributed throughout the length and breadth of the United States, and their paper collars, cuffs and shirt bosoms adorned the necks, wrists and breasts of a vast army of American citizens. In that era the use of paper haberdashery was as general as is the wearing of soft collars today. The inventive genius of the founders of this Springfield company was responsible for machinery which cut from thirty to eighty paper collars in one operation, while a specially designed serrated wheel was evolved to provide the effect of stitches on the border. In that period a man was scarcely considered to be properly groomed unless he bore about his neck a "Lord Derby," a Beecher garrote (a "stand up" collar), named in honor of the great American divine, or a "Byron," "Dante," or "Longfellow" while those manufactured for the ladies carried the names of "Shakespeare" and "Florence" and great was the fame of Springfield in the paper collar era.

Even taking so recent a period as 1902—less than thirty years ago—what do we find delineated in the necrology of concerns then existent, but now no more?

At that period, Springfield had in addition to the many units previously mentioned, and others, such well-known concerns as these, which are no more:

Mill River Machine Shop; R. P. Whipple & Co., producers of patent blind hangers; the Chadwick Copying Book Company; Springfield Printing & Binding Co.; R. H. Long Shoe Manufacturing Company; Chamberlain & Co., brass founders; D. J. Curtis & Co.; Phillips Brothers and Potter & Potter, all engaged in making brick; John W. Russell and E. S.

Stacy, button machinery makers; Burgin Brothers; Iroquois Manufacturing Company, canvas goods; New England Card & Paper Co.; Natrick Underwear Company; T. M. Walker & Co., sash, doors and blinds; Crown Chemical Company; Fast Color Eyelet Company, and Springfield Covered Eyelet Company; Planet Manufacturing Company, producers of horse feed bags, now located in Westfield; Tucker & Cook Manufacturing Co., knitting manufacturers; Hopkinson Machine Works; Spragel Iron Works; Olmstead & Tuttle Co., mattress manufacturers; Springfield Felting Company; Burgett Paper Box Company; P. P. Kellogg & Co., now a division of the United States Envelope Company; E. C. King, N. W. Merrill and C. C. Taylor & Co., all engaged in paper box manufacture.

Today, Springfield would be loath to exchange the units of a quarter or a half century ago, thrifty though most of them were, when the demand existed for their products, many of which were peculiar to their eras, for the Westinghouse Electric & Manufacturing Co.; the Chapman Valve Manufacturing Company; the American Bosch Magneto Corporation; the Milton Bradley Company; the General Ice Cream Company; the Fiberloid Corporation; the Gilbert & Barker Manufacturing Co.; Hodges Carpet Company; the Indian Motorcycle Company; the Indian Orchard Company; Kibbe Brothers Company; Fred T. Ley & Co., Inc.; the Moore Drop Forging Company; the Springfield units of the U. S. Envelope Company; the National Equipment Company; the New England Box Company; the Package Machinery Company; the Powers Paper Company; the Baush Machine Tool Company; Rolls-Royce of America, Inc.; Smith & Wesson, Inc.; the Springfield Gas Light Company; the United Electric Light Company; the Van Norman Machine Tool Company; the Wason Manufacturing Company; the Wright & Ditson Victor Co., employing all the way from 250 to upwards of 5,000 workers, and the more than 350 other manufacturing units, which have increased numerically 12 per cent in less than ten years. Twenty-four Springfield concerns have a production whose annual value is in excess of $1,000,000 each, as follows:

1. Electrical machinery, apparatus and supplies.
2. Motor vehicles, bodies and parts, including motorcycles.
3. Foundry and machine shop products.
4. Envelopes.
5. Printing and publishing.
6. Bread and other bakery products.
7. Knit goods.
8. Meat packing.
9. Chemicals.
10. Iron and steel forgings.
11. Carpets and rugs.
12. Toys and games.
13. Stationery goods.
14. Confectionery.
15. Cotton goods.
16. Firearms.
17. Paper goods, not elsewhere classified.
18. Metal working machinery, including machine tools.
19. Matches.
20. Sporting and athletic goods.
21. Brass, bronze, copper and allied products.
22. Steam railroad cars.

23. Patent medicines.
24. Ice cream.

Thirty-four of the city's manufacturing concerns, at some period in 1928, carried more persons on their payrolls than at any other time during the preceding four years, while 389 industrial concerns were employing on September 30, 1928, more persons than upon the corresponding dates in any of the three preceding years.

That year, eighteen Springfield corporations found it necessary to provide increased floor space for their expanding operations.

There were but three industrial failures in the city during the calendar year of 1928, and the effect of these upon the manufacturing space was purely nominal.

Fourteen new industries were established in Springfield that year, and but five, all relatively small, removed from the city in 1928.

In 1927 Springfield was the eighth city in industrial importance in Massachusetts, measured by product value. Manufactured commodities valued at $105,152,593 were produced in the city that year by 17,059 wage-earners, to whom were paid in wages $22,504,231.

In 1921 the value of the city's manufactured products was but $74,488,113.

In the field of electrical machinery, apparatus and supplies the progress from 1921 to 1927 was most marked. In the former year the value of these products locally manufactured was $3,258,287; in the latter year, it rose to $15,273,652.

Foundry and machine shop products showed an increase from $6,553,473, in 1921, to $9,392,165, in 1927, while the value of paper goods produced rose from $756,084, in 1921, to $1,322,928, in 1927.

CHAPTER XXVII

HOLYOKE

THE PAPER CITY OF THE WORLD

To the artificial water courses, constructed by the Hadley Falls Company and its successor, the Holyoke Water Power Company, the industries of the city of Holyoke owe their very existence.

Had these agencies been denied local and outside industrial capital no doubt Holyoke would have remained a municipality of moderate size instead of becoming the seat of upwards of 160 industrial establishments, which annually produce upwards of $90,000,000 worth of manufactured commodities.

In the earlier years of the nineteenth century, when manufacturing began to interest the attention of the New England capitalists, the then undeveloped water power, which was running to waste, was studied carefully, and Lowell, Lawrence, Fitchburg, and many other towns, which at that period were almost exclusively devoted to agriculture, furnished evidence of the combined effort necessary to utilize the potential energy of the streams that formerly flowed unvexed to the sea. Today, cities with varied industries support large populations, where formerly a few cattle grazed on a scanty herbage, or where a small farmer, by dint of hard labor, gathered a meagre harvest.

It is interesting to observe that the chief river of New England, the Connecticut, was at first thought to be too large a stream to be successfully mastered and diverted to power purposes. But industry, like ambition, thrives by what it feeds upon, and as man easily performs tasks which to the youth seem impossible of accomplishment, so the Holyoke Water Power Company successfully carried to full fruition the engineering project which to the generation that lived before its creation it seemed absurd to attempt.

As late as 1831—less than a century ago—the present site of this vast water power was a rocky channel, through which the majestic Connecticut ran to waste over what was regarded as the great rapids, or falls of South Hadley, situated at a point between the lower village of South Hadley on the easterly side of the river, and a then sparsely settled agricultural district, commonly known as Ireland Parish, at that time a part of the town of West Springfield, on the westerly banks of the stream. In the distance of a mile and a half the rapids fell sixty feet.

In 1831 the Hadley Falls Company was formed for the purpose of utilizing a portion of the power, through the medium of a wing dam on either side of the stream, which would divert a portion of the flow and thus make it available for industrial purposes, by means of canals. A small paper mill on the east side, and a cotton factory of 2,000 spindles, were provided with power following the initial attempt to harness the waters.

Not until 1847, more than a decade and a half later, was consideration given to damming the entire river, and the first power company was established, which soon passed into the hands of Thomas H. Perkins,

George H. Lyman, and Edmund Dwight, who formed the Hadley Falls Company and whose capital was increased to $4,000,000, and a dam 1,019 feet in width was completed on November 19, 1848, but nature seemed for the moment to put to naught the herculean effort of man in erecting this barrier to the flow of the stream, as on that day, before the waters had risen to a point to permit them to pass over the crown of the dam, it gave way with a mighty crash, carrying the ruins of the structure which had been erected to stay the river's course.

Less courageous souls would have succumbed, but the officials of the company were not dismayed, and with that persistence typical of New Englanders, they immediately began the erection of another dam, which was finished on October 22, 1849, and, followed by the building of three canals, at different levels, more than eight miles of available mill sites were equipped with power facilities exceeding those at Lowell and Manchester combined, and at the time affording greater capacity than that of any similar structure in the world. The 1847 estimate of the water passing through the channel at low-water mark was found to be 6,000 cubic feet a second, which, converted into power, gave a total of 30,000 horse-power, and allowing for a one-third reduction covering the variable seasons of the year, the 20,000 horse power was equivalent to 300 mill powers.

The total loss of the first dam and the expense of building the second financially involved the original company, and during the depression of 1857 it was forced to suspend. The assets were bought by Alfred Smith, of Hartford, Conn., for $325,000, and in January, 1859, he became president of the Holyoke Water Power Company, with Benjamin Day, treasurer.

In 1868 the dam, then twenty years old, was rebuilt and strengthened by the addition of a new front which cost $400,000 and from that time this great industrial city of Holyoke began its onward march and in reality the municipality may be said to be the legitimate offspring of this great engineering work which resulted in the utilization of the immense hydraulic energy of the Connecticut River. What had been a sterile pasture and a comparatively barren spot were changed into a thriving and enterprising manufacturing center as the result of the harnessing of the potentialities of New England's biggest river.

As early as 1861 the company inaugurated a policy of philanthropy, deeding to the city that year 115,000 square feet of land for Hampden Park. This was followed by the giving of land for school sites, and, in 1877, Germania Park, of 11,000 square feet, was donated to the city, followed by Prospect Park and the Crescent and Park Street triangle, in 1890, and finally the gift of 114,000 square feet for the public library site.

Not until the dawn of the twentieth century did Holyoke witness the completion of the present massive stone dam, which superseded the previous structure that had rendered satisfactory service for half a century. The new barrier to the raging waters of the Connecticut was begun in 1895, and involved the building of 50,000 yards of solid masonry, thirty feet in height, at a cost of $530,000. Today, the basic industry of Holyoke has been defined as the production of water power for industrial purposes. With two units, the Holyoke Water Power Company and the municipal lighting plant, the city is in a splendid position to furnish energy to its industrial concerns.

It seems on the face of the figures that no man can truthfully say Holyoke was suffering from an industrial decline either in 1927 or 1928.

The Holyoke Water Power Company's generating plants put out 27,000,000 kilowatt hours of electricity in 1926; 42,000,000 kilowatt hours in 1927, while in October, 1928, the first month of the company's fiscal year, its sales of electric power were 20 per cent in excess of the same month in 1927, and its sales of water power had increased approximately to the same extent. The flow of the Connecticut had been so favorable in 1928 that not since the previous December had the company been called upon to burn a single pound of coal.

As practically all the available floor space for manufacturing purposes was then filled, the way was opened for land sales by the water company. At one period, the corporation owned the entire terrain which now comprises the city of Holyoke, upwards of 1,100 acres being bought by its predecessor company, in the late '50s. Its land holdings are still considerable.

The company's power, barring some small part sent across the river to South Hadley, is used in the manufacturing industries of Holyoke, supplementing in many cases water power already installed and insuring to manufacturers needed additional power for their use during the year. While the full capacity annually of the combined steam and water power generating units is not likely to be employed continually, at least for some time, it is of interest to note that if all the generating machinery were to operate full for a year 140,000,000 kilowatt hours could be produced.

These figures show the power potentialities of the locality and are bound to attract and command the attention of industrial capital anxious to be invested in a city where cheap power, cheap lighting, low taxes, economical municipal government, superior transportation and highly skilled labor reside. Holyoke has a canal system capable of providing constant water power sufficient to take care of her industrial needs for many years to come.

President Robert E. Barrett, of the Holyoke Water Power Company well says: "The future prosperity of New England in my opinion is going to rest largely on the ability of the manufacturers to adapt themselves to changing conditions and changing demands. The manufacture of staple and standard goods is overdone; success in the future is more likely to be achieved, as it is being achieved, by the turning of attention to specialties and the ability to change with more or less rapidity from one specialty to another."

A NEW HYDRO-ELECTRIC DEVELOPMENT

In June, 1929, the directors of The Holyoke Water Power Company authorized the erection of a hydro-electric plant on the second level canal, on land of the company near Appleton Street and adjacent to the Norman Division of the American Writing Paper Company, Inc.

The plans of the water power company will be preliminary to an expenditure of more than $500,000 in improvements. This decision synchronizes with the plans of the Holyoke Gas and Electric Commission to erect a conveyor at the municipal plant for carrying material over a raceway between that unit and the gas works, thereby saving an expensive cartage of the same material.

This improvement will necessitate an expenditure of more than $50,000 by the Gas and Electric Commission with considerable other improvements in prospect in the department. The aid afforded by these increases in power facilities will be potent in bringing new industries to Holyoke.

The capacity of the first unit of the Holyoke Water Power Company's

proposed plant will be about the same as the combined capacity of the three hydro-electric units installed in the plant near the mill of the Whiting Paper Company, in 1924.

The location of the new plant offers a somewhat greater fall on the Connecticut River than at the plant near Mosher Street, where hydro-electric units have been in operation since 1906.

THE PARSONS PAPER COMPANY

The story of the Parsons Paper Company goes back to the work of a trio of pioneers in the paper industry—Joseph C. Parsons of Suffield, Conn.; Col. Aaron Bagg, of Springfield, and Whiting Street, of Holyoke. Mr. Parsons was one of the most successful paper makers of his era, and spent forty-three years of his life in Holyoke, living to see before his death in 1886 the $60,000 corporation he fathered there grow to a business of more than $1,000,000 a year. In 1839 he left the drug business in which he was engaged, and returned to Northampton, where he was born. There he assumed charge of the Ames Paper Company, owned by John Ames, the well-known Springfield pioneer paper maker. Later Mr. Parsons went to South Hadley Falls, where he managed another mill owned by the Ames family, and when it was burned he removed to Suffield, Conn., where he purchased a hand mill, which produced the first American paper used by the Congress of the United States, and where he organized the Eagle Mills Company, with capital of $30,000. In 1853 he sold his interest in that concern, as he realized the water power there was insufficient to warrant the growth of the plant.

Mr. Parsons sought a location in Holyoke, but when he approached the Hadley Falls Company for a site and power privileges he was told that the corporation did not care to assist in founding an industry that would not succeed, or in erecting a brick mill only to have the machinery break down the walls. However, he promptly negotiated with the owners of a grist mill, which stood near the dam, and the officers of the water power company then came forward and offered him a suitable site nearby if he would surrender his option on the grist mill, which they were anxious to have continued in operation.

Accepting the proposition the Parsons Paper Company came into being on September 30, 1853, Mr. Parsons being elected treasurer and agent, and Colonel Bagg, president. The original capital was $60,000, which was subscribed by seventeen stockholders. At the outset various kinds of paper were produced but eventually a famous colored flat and envelope type was evolved. Colonel Bagg died in 1881, and Mr. Parsons in 1886, and upon the latter's death J. S. McElwain succeeded him as agent. Under his administration a new mill was equipped for the manufacture of bond, linen and ledger papers. The capital was increased to $360,000 in 1896 and upon the resignation of Mr. McElwain as agent, in 1893, Edward P. Bagg, who had been chosen treasurer in 1884, succeeded him. When the two Parsons Mills at the head of the first level canal were sold to the American Writing Paper Company, in 1899, the attention of William McCorkindale, who was superintendent of the remaining plant, was centered on building up high grade bond and ledger papers, made of rags, and he brought out the first product of the latter type ever made in Holyoke.

In 1922 the capital stock of the Parsons concern was increased to $2,000,000. The daily capacity of the plant is ten to twelve tons. In the more than seventy years of existence of the company it has had but

two treasurers and the present incumbent, Edward P. Bagg, has been with the concern for fifty years, while the assistant treasurer, Charles P. Randall, has been identified with it for forty-five years, and Superintendent McCorkindale, who retired in 1924, served it for forty-two years. Aaron C. Bagg is vice president, Elmer B. Cooley, assistant treasurer, Albert S. Canfield, secretary, and Geo. A. Eastwood, assistant manager of the corporation, which employs 250 to 300 operatives.

FEW CHANGES IN OLD-ESTABLISHED UNITS

The Lyman Mills were incorporated in 1854, with capital of $1,470,000, two mills owned by the Hadley Falls Company, with their machinery, land, and four blocks of tenements, being acquired by the new corporation, these factories having been erected between 1848 and 1854. In 1872 a third mill was built, and for years standard sheetings were produced.

In 1927 the directors voted to liquidate the corporation, and that year the plant was sold to the Whiting Paper Company, which concern is now utilizing it in extending its production.

In studying the present day list of Holyoke's manufacturing concerns and comparing it with those of twenty-five or fifty years ago one is struck by the fact that the vast majority of the old-established units are still carrying on production, a few under changed corporate cognomens, it is true, but nevertheless the identity of the original companies is preserved in almost every instance. This condition does not exist in so marked a degree in any other large manufacturing city in the state, and it seems to be a tribute to the financial ability and successful management of the local units.

The list of corporations established in Holyoke up to the beginning of this century reveals how important the locality has been from the beginning of its industrial career in the field of paper manufacturing.

No other city in the state shelters so many paper-producing units, and in no other Massachusetts town is so much high grade paper manufactured as in Holyoke. The municipality richly deserves the title which was bestowed on it long ago—"The Paper City."

The importance of Massachusetts in the production of the higher grades of paper is shown by the fact that, according to the latest figures, $34,000,000 of the $90,000,000 value of writing paper is manufactured in this state, while $2,000,000 of the $5,000,000 worth of cover paper; $22,000,000 of the $141,000,000 worth of book paper, which includes the kind used in magazines; and $2,800,000 of the $10,000,000 worth of high grade tissue paper are produced in this Commonwealth. Combining these branches of the fine paper industry it is observed that $60,800,000 out of the total $246,000,000 value is produced in Massachusetts, or about 25 per cent of the whole.

Of 746 paper establishments of all kinds in the United States, eighty-two are located in Massachusetts, or about 11 per cent, and they employ 15,000 workers.

While paper of various kinds is manufactured in not less than thirty-three towns and cities in Massachusetts it is to be noted that in Holyoke alone, in 1927, more than 3,500 of the 15,000 paper mill employees in the state were carried on the payrolls of Holyoke paper companies, while this principal industry of the city accounted for $22,594,782 of the total value of all products made in the Hampden County municipality during the calendar year of 1927, or 27 per cent of the combined total value.

In 1857 the Holyoke Paper Company was organized, and had a daily

capacity of one ton per day. Ultimately the plant occupied an acre, and in 1878 ten tons of fine linen and parchment papers were turned out daily. The plant was acquired in 1899 by the American Writing Paper Company, which operates it today as one of the units of that corporation.

GEORGE W. PRENTISS & CO.

Three generations of the Prentiss family have been identified with the sound policies of George W. Prentiss & Co., since the spring of 1857, when George W. Prentiss and Joshua Gray, with $6,000 capital, established the business, which bears the former's name, in a small mill, belonging to the Parsons Paper Company. In 1862, the Holyoke Water Power Company erected a brick mill for him, and seven years later Mr. Prentiss built a new plant and installed new machinery. In 1871 M. W. Prentiss, a cousin, entered the firm, and six years later William A. Prentiss, son of the founder, became identified with the concern, and ultimately became the head of it, which position he still holds, his son, George W. Prentiss II, being treasurer and general manager. In the beginning, the concern produced the finer sizes of iron wire, and specialties, and from 1863 to date Chickering & Sons, of Boston, manufacturers of pianos, have been regular customers in the purchase of wire for piano strings. Steel wires were added later.

The senior Prentiss developed many new processes, being the first manufacturer to use the continuous method of tinning wire; the first to adopt continuous tempering and patent annealing of carbon steel wire, and collaborating with the inventor of the first wire stitching machine used for bookbinding, the initial order for this commodity being received by the firm on May 1, 1875.

The original capital of $6,000 has grown to $250,000, and the handful of employees carried on the rolls at the outset has increased to 225 today.

W. A. Prentiss is president, George W. Prentiss, treasurer and general manager, and W. F. Bachelder, secretary.

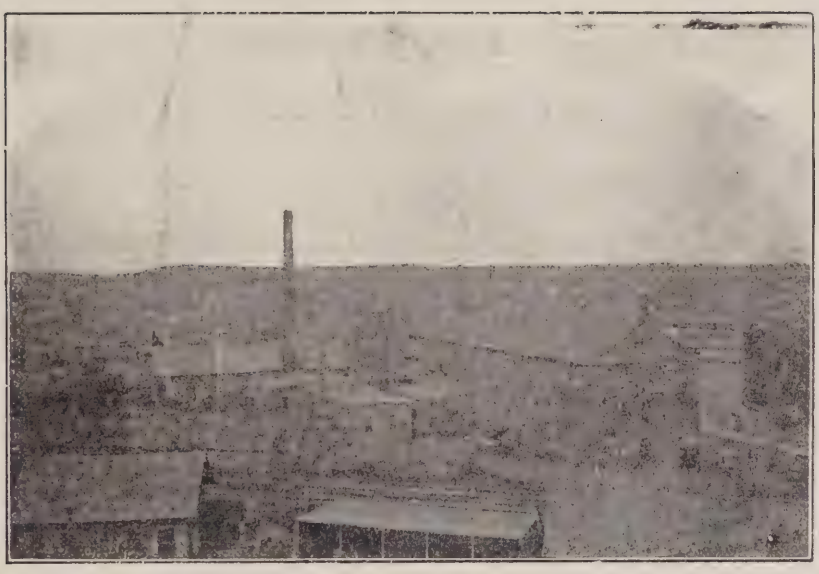
THE WHITING PAPER COMPANY

The Whiting Paper Company was incorporated in 1865 by William Whiting with $100,000 capital, although the firm had built its first mill, of five tons capacity, on the upper level canal, three years before.

A few years later a six ton mill was added on the upper level canal, which was equipped with ten 800-pound beating engines and two Fourdrinier machines, 66 and 78 inches respectively. About 500 hands were employed, and the pay roll, remarkable for those days, amounted to $19,000 a month.

Fourteen years from the inception of the concern it had capital of $1,200,000 and ranked as the second largest paper manufacturing unit in the world, exceeded only by a concern in Aberdeen, Scotland. It was, of course, the largest paper producer in this country.

With the acquirement of the Lyman Mills, in 1927, their complete renovation for paper manufacturing purposes, and their opening in October, 1928, the Whiting Paper Company became the largest producer of fine writing papers in the world. Considered merely in terms of the physical properties transferred, the sale of the Lyman mills was a big event for the city, including five mills, two storehouses, a power plant, seven brick tenement blocks, accommodating more than 200 families, waterpower reckoned as 1,300 permanent and 400 surplus horse-power, and some forty acres of land. All the buildings are of brick construction.



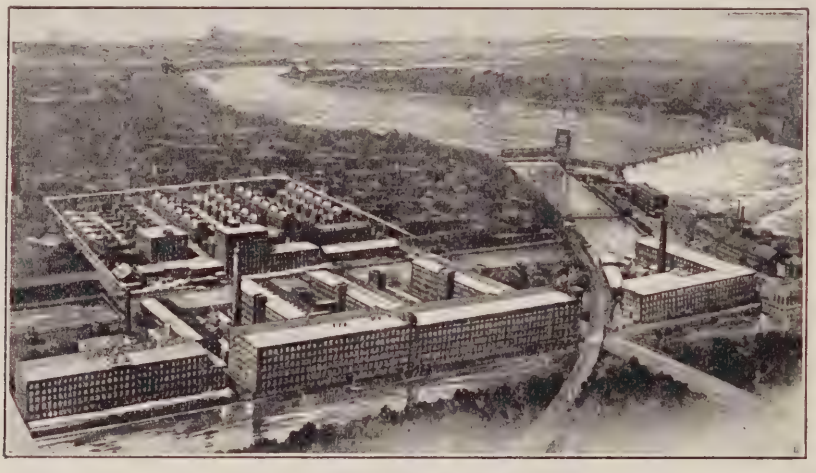
No. 1 MILL, WHITING PAPER COMPANY, HOLYOKE, 1875



WHITING PAPER COMPANY, HOLYOKE

Months of work in rebuilding and remodeling the property preceded the use of the plant by the new purchaser. The old Lyman Mill, No. 3, was reinforced from roof to cellar with structural steel, and the two lower stories were made into one huge room of two-story height, in which were installed twin paper-making machines built by Rice, Barton & Fales Co., of Worcester—the largest in use by the Whiting concern—bringing the total to seven Fourdrinier machines operated by the company. The two upper stories of this structure have been equipped with special processing machinery.

This building is directly connected with the southern half of the long structure fronting on the second level canal, the former No. 5 Lyman Mill. All of the five stories of the last-named building have been put to use, the first floor being devoted to the shipping department, the second is used as the beater room and the third as the rag room, while the two upper stories are employed for storage.



Nos. 1, 2 and 3 MILLS OF THE WHITING PAPER COMPANY, HOLYOKE

These buildings, with two stock houses, a boiler house, and turbine room comprise practically half of the entire industrial floor space acquired from the Lyman Mills.

A new line of paper was introduced, supplementing the lines of fine writing paper familiar to the trade, and the new plant is devoted entirely to this part of the production. This new addition is considered an event of distinct interest to the paper trade, for while a logical accompaniment to the older lines it is said to mark a departure from the company's established procedure. It involves no curtailment of production in the older mills of the company. Nos. 1 and 2 mills continue to operate as heretofore, without change, while the new mill has entered a production of a new line for which a large demand is said to exist.

Much 100 per cent rag paper is made in the Whiting mills, and all of it has some rag content. The new line, like most of the paper already produced in these mills, carries a high percentage of rags.

The Lyman Mills property combines with the old Whiting mills to form a compact group strategically located in the heart of the city. When the purchasers acquired the Lyman Mills they also took over about 1,300

horse-power of indentured permanent water power and in addition some 300 to 400 horse-power of indentured surplus water power.

For the community of Holyoke the opening of the new mill was of special interest and importance because it meant the immediate addition of some 350 to the employment force of the Whiting mills, which totaled in the vicinity of a thousand in the older establishments. A fourth plant employs about 400 hands for the manufacturing of fine stationery.

The products of the company have received awards at many expositions, including first prize at the Cincinnati Exhibition in 1874; first prize and special medal for best writing paper at the Philadelphia Centennial in 1876; first prize at Paris in 1878; first prize and special medal at the New Zealand Exposition, in 1882; first prize and special medal for fine stationery at the American Institute, New York, in 1892; first prize and medal of special merit at the World's Columbian Exposition, Chicago, in 1892-1893; first prize at the National Export Exposition, Philadelphia, in 1899; first prize at the World's Exhibit, in Paris in 1900; and the grand prize at the Philadelphia Sesquicentennial Exposition in 1926.

The company maintains offices in New York, Philadelphia, Chicago and Boston and at present is managed by Hon. William F. Whiting, United States secretary of commerce, who succeeded the late Hon. William Whiting as president of the Whiting Paper Company, at the time the former retired from active part in the affairs of the company when he was appointed to President Coolidge's cabinet, following the resignation of Secretary Hoover, in 1928, his eldest son, William Whiting, II, was elected president. For several years the latter held the office of treasurer, in which post he was succeeded by the second son, Edward Chapin Whiting. The third son, Fairfield Whiting, is secretary of the company, and devotes his activities especially to manufacturing supervision. All three brothers have had the benefit of years of practical experience in the establishment. Sidney E. Whiting is assistant treasurer of the corporation.

THE HOLYOKE MACHINE COMPANY

The Holyoke Machine Company, one of the country's pioneer manufacturers of pulp and paper mill machinery, was incorporated October 1, 1863, and was among the first to make calenders for use in paper mills.

Stephen Holman, who was elected treasurer, in 1870, served for thirty-three years, maintaining an active interest in the company up to the time of his death in 1912, when he had reached the age of ninety-two years.

Sanford S. Stebbins became agent in 1872, and was succeeded by Herbert J. Frink, in 1882. In 1903, the latter was elected treasurer and became president and treasurer in 1906, which offices he now holds. His son, Herbert L. Frink, is the assistant treasurer.

Under the guidance of Mr. H. J. Frink, from 1903 until the present time, the company made its greatest strides in progress and success, and during that period has manufactured equipment for pulp and paper mills, which was notable for record size, capacity and performance. Some of the widest super-calender stacks on record were made and installed by the Holyoke Machine Company.

With the constant progress and betterments in mill machinery, the company kept well apace, enlarging and bettering its facilities and equipment so as to adequately serve the paper industry. The chief items manufactured at the outset were washing and beating engines, rag cutters, rag

dusters, super-calenders and other finishing machinery and it installed its machinery and equipment in all of the paper mills in Holyoke and in neighboring mill towns and cities, later spreading its activities throughout the United States and Canada.

In the years following, wood pulp machinery was added to its general line to meet the initial efforts in the production of paper from wood, and it has manufactured and installed machinery of this type in many of the pulp mills in this country and Canada.

The manufacture of Hercules turbine water wheels and power transmission for pulp and paper mills formed a large portion of the company's endeavors. In order to concentrate on this line of manufacturing, a branch plant was established at Worcester, in 1882, where the company has facilities for a complete development of water power and shafting work.

When the manufacture of calenders was started, the production of paper and cotton calender rolls was developed and the concern is now one of the country's largest producers of such equipment.

From a small shop and foundry covering some 28,000 square feet of floor space back in 1863, the company has grown to a plant at Holyoke, with floor space of more than 154,000 square feet.

For a single customer, the company has furnished 122 wood pulp grinders; for another single customer, it has made and installed 100 washing and beating engines; for still another, nineteen web super-calenders and sixty-three beating engines, and to another sixty-eight web super-calenders, many of which ranged from 100 inches to 158 inches face.

The company's exclusive, patented improvements, backed by lengthy experience, enables it to produce machinery economical both in consumption of power and in operating expense.

The company has capital of $400,000, and employs from 300 to 350 employees in its Holyoke and Worcester plants.

THE AMERICAN THREAD COMPANY

In 1863 the Hadley Spool-Cotton Manufactory was organized, with $600,000 capital, and erected a factory and tenement houses. Fifteen years later it owned six large blocks, containing fifty-three tenements and in 1880 was operating 29,664 spindles.

In 1864 Timothy and Austin Merrick and Origen Hall, who, as partners, had established Merrick Brothers & Co., in Mansfield, Conn., decided to remove to Springfield, where water power facilities were superior, and, in July, 1865, began the production there of a new six-cord type. In 1865 a new company, first styled the Holyoke Thread Company, was formed but soon changed to the Merrick Thread Company, with original capital of $200,000, which was increased to $350,000 three years later. Three large buildings were erected, in Holyoke, where the manufacture of spool cotton was commenced, and, in 1877, the Hampden Junior Mill, owned by the Hampden Mills Company, was acquired as an auxiliary plant.

Ultimately the American Thread Company acquired all the local plants devoted to the production of thread, and now operates three units in Holyoke, employing 2,000 men and women, and a large plant in Fall River.

It has capital of $18,000,000 and produces cotton threads and yarns. R. C. Kerr is president and J. G. Wylie treasurer and secretary. The main office is at 260 West Broadway, New York City.

THE VALLEY PAPER COMPANY AND THE GERMANIA MILLS

The Valley Paper Company was organized and erected its plant in 1864 to manufacture fine writing and envelope papers, and at the start turned out between two and three tons per day.

Superior bond and ledger papers and specialties are produced today. The company has capital of $200,000. George F. Fowler is president and treasurer, G. Stanley Morse, vice president, H. S. Bridgman, secretary, and George B. Fowler, assistant treasurer.

In 1865 the Germania Woolen Mills, now the Germania Mills, were established, and when in 1928 a part of the plant was destroyed by fire, a new $60,000 unit was erected.

For sixty-five years this concern has been one of the leading industrial enterprises of the city and has shown a steady and consistent growth until today it ranks high among the textile units in the quality of the woolen and worsted fabrics it produces, and in the number of employees carried on its payrolls, having some 900 men and women operatives.

The plant is equipped with sixteen sets of worsted cards, twenty-four sets of combs, 117 broad looms, two garnets, two pickers, 6,516 woolen, 11,000 worsted and 3,000 twist spindles, four boilers, two water wheels, and complete dyeing and finishing departments.

W. Stursburg is president and treasurer and W. Mauer secretary of the corporation, which has capital of $1,500,000. Its success in the field in which it operates is but added evidence that a well-managed textile corporation can continue to be prosperous in Massachusetts.

JAMES HALE NEWTON AND THE FRANKLIN PAPER COMPANY

From 1864 to 1921, a period of fifty-seven years, James Hale Newton ranked as Holyoke's foremost representative in the manufacture of paper. In the former year, with his two brothers, he incorporated the Hampden Paper Company, and before he ceased his activities he founded seven large local paper units, actually performing the work of drafting the paper plans, financing the enterprises, incorporating them, and erecting the plants.

These units comprised the Hampden Paper Company, the Franklin Paper Company, the Albion Paper Company, the Newton Paper Company, the Wauregan Paper Company, the Norman Paper Mill and the Chemical Paper Company. In 1869 Mr. Newton invented and patented a process for making cloth paper for collars, consisting of running cotton cloth through a paper-making machine simultaneously with the pulp, thus forming a layer of paper of suitable texture and thickness on one side and firmly attached to the cloth on the other—the first successful combination of that nature.

The Newton Paper Company traces its history to Mr. Newton, who, in 1866, organized the Franklin Paper Company, and in 1867, the Albion Paper Company, now one of the units of the American Writing Paper Company.

The Franklin Paper Company, now approaching its sixty-fifth anniversary, has capital of $50,000, employs seventy-five hands, and manufactures bristol boards. Robert A. Ramage is president, James B. Ramage, vice president and secretary, and George C. Waters, treasurer.

THE D. MACKINTOSH & SONS CO.

In 1866, David Mackintosh, who had gained a wide experience in the cotton dyeing industry in Paisley, Scotland, and Leeds and Kidderminster, England, as well as at Hartford, Conn., and Holyoke, began business in his own name and had enlarged his Holyoke plant and was meeting with success when fire swept away his factory five years later. He then set up a plant in Northampton, but soon returned to Holyoke and five years after he started business there for a second time, the Hampden Mills, where he had been employed, failed and he bought the plant and formed the D. Mackintosh & Sons Co., his associates being his two sons, Col. John G. and Charles E. Mackintosh. There many of the present methods of dyeing were first introduced, the dyeing of raw cotton being first practiced in this plant. The business prospered from the beginning and the concern ranks among Holyoke's prominent industries.

The company was incorporated in 1889 and has capital of $350,000 and employs 325 operatives in the production of cotton yarns. Charles E. Mackintosh is president and treasurer, L. D. Horne, secretary, and H. P., M. E. and D. C. Mackintosh, with the above, constitute the board of directors.

THE MERRICK LUMBER COMPANY

John Merrick began the manufacture of window and door frames, vats, and other products, in 1870 and three years later A. Judson Merrick acquired an interest in the business. In 1875 the concern bought the lumber firm of Wiggin & Flagg and in 1884 the Merrick Lumber Company was incorporated by John A. Judson, Timothy and Joseph S. Merrick and Edwin Bradley.

At the outset contracting building was done, and one of the company's notable structures was the Merrick Thread Company's Appleton Street mill. The large plant now turns out all kinds of builder's finish, cabinet work, window frames, doors and windows, and occupies over 1,800 feet of lumber sheds, two and three stories in height, and uses 1,000 feet of railroad track, in the Holyoke yards alone, with capacity to unload a dozen freight cars simultaneously.

Branch yards were opened at Westfield in 1886, at Northampton in 1888, and Easthampton, in 1911. At Holyoke there are extensive dry kilns and storage for dry lumber. Over 100 people are employed in the combined plants, and the total lumber storage capacity is fully 5,000,000 feet.

The corporation has capital of $300,000, J. Leonard Merrick is president, and Frank B. Merrick, treasurer.

In 1870 Messrs. D. H. and J. C. Newton established the Crocker Manufacturing Company, with capital of $60,000, and built a mill where paper adapted to the making of men's paper collars and shirt fronts, was produced. Eight years later the concern bought the old Albion Mills, and in 1880 increased its capital to $90,000, colored and ornamental papers to the amount of four tons daily being manufactured.

THE SPRINGFIELD BLANKET COMPANY

The Springfield Blanket Company, Inc., has been continuously in operation since 1872, and notwithstanding its name, which comes from the fact that Springfield capital financed it and Springfield men have managed it, the plant has been located in Holyoke for more than fifty years.

Despite the magnitude of the automotive interests, the horse is still a factor to be reckoned with industrially, although the number of establishments looking to the noble steed for their salvation are in a diminishing ratio. This concern, with two others, one in Troy, N. H., and the other in Middletown, Conn., are said to produce the great bulk of horse blankets used in the United States. The chief market is the West and the mainstay of the Springfield concern is the cornbelt of the prairies and the Mississippi Valley, for it is in these sections more than any other agricultural areas that the horse has been able to hold its ground against automobiles, since no satisfactory machine has been devised as yet to replace the equine in the cultivation of corn.

The concern was incorporated in 1919 and is capitalized for $200,000 and employs 200 operatives.

E. H. Wilkinson is president and treasurer, William P. Welsh vice president, and Alfred F. Crandall, secretary, of the corporation.

THE FARR ALPACA COMPANY

A great deal is said and printed these days concerning the migration of textile industries southward, but it is noticeable that only in the cotton field is this true. The South has gained little impetus from woolen, worsted and allied lines, and the total production of these types below the Mason and Dixon Line is insignificant.

Given good management, abundant power at reasonable rates and average transportation facilities there seems to be no reason why woolen and worsted units should not continue to prosper in Holyoke in the future as in the past.

One need not go outside Massachusetts to find safe industrial investments.

One of the romances of successful business life in New England and a story of wonderful growth is found in the career of Holyoke's principal textile corporation, the Farr Alpaca Company. On November 13, 1873, Jared Beebe, H. M. Farr, Joseph C. Parsons, Andrew Allyn, Joseph Metcalf, George Randall and Timothy Merrick, incorporated the company to manufacture worsted goods, and its modern plant is now equipped with 3,800 looms, and combing and spinning machinery.

Like many other present-day large industries, the concern started in a modest way, with about 400 employees. In normal times today it utilizes the services of more than 3,500 men and women.

Formed in the midst of the hard times of 1873, some people looked at the project as speculative, at the best, and no one dreamed of the exceptional growth it was to achieve in after years. It had been operating only about two years when it made a display at the Centennial Exposition in Philadelphia, where it was given first prize awards "for an excellent exhibit of black alpacas, mohairs, cashmeres and serges; all of superior manufacture."

The products of the company today consist principally of worsted dress goods and of coat linings. Its worsted goods are made from extra long combed wool, also from wool from the Angora goat, and the alpaca of Peru, a species of the llama.

The company claims to have been the first in this country to manufacture all wool cashmeres and henriettas, and the first to make serge linings to compete with those made in Bradford, England.

In 1928 the company entered the rayon field, producing this line prin-

cipally for men's wear, a natural step inasmuch as for many years it has been a large manufacturer of worsted linings.

In women's wear a line of slip fabrics that meets with good demand has been developed at the plant, while drapery effects of handsome appearance have been turned out.

In its plant fifty-one miles of cloth can be woven in a day, or more than 16,000 miles a year. More than 6,000,000 pounds of wool are used annually and 7,388 horse power are required of which 1,080 is water power, and the balance steam.

The company has capital of $14,000,000. Frank H. Metcalf is president and treasurer, Addison L. Green, chairman of the board, and Edward J. Meacham, secretary of the corporation.

It is not alone in the field of paper production that Holyoke can point with pride, for in the textile industry the city has long been a great factor and perhaps never more so than today, despite the fact that one large unit has recently liquidated and sold its plant for other purposes.

But measured by successful operation, enhanced production and uninterrupted dividend payments a number of the local plants have reflected successful managements over long periods of years.

The manufacture of woolen and worsted goods is Holyoke's second industry, measured by the value of the annual production, not less than 16.6 per cent of the total in 1927 being represented in the volume of commodities turned out by the four large woolen and worsted corporations doing business in the city. These products were valued at $14,719,151, and with paper account for almost 45 per cent of the total industrial productive capacity of Holyoke.

B. F. PERKINS & SON AND THE AMERICAN TISSUE MILLS

The firm of B. F. Perkins & Son, Inc., dates back for fifty-seven years to 1873, when Benjamin F. Perkins started a small job shop to serve the paper mills in Holyoke. When the original plant was entirely destroyed by fire in 1888, he rebuilt it, and admitting his son, the late J. Lewis Perkins, to partnership, formed B. F. Perkins & Son.

In 1882 the manufacture of calender rolls was begun, but Mr. Perkins did not even own a press, sharing one with a paper company in that city. In 1886, two Holyoke merchants endorsed his note for $1,000, which enabled him to buy his first press.

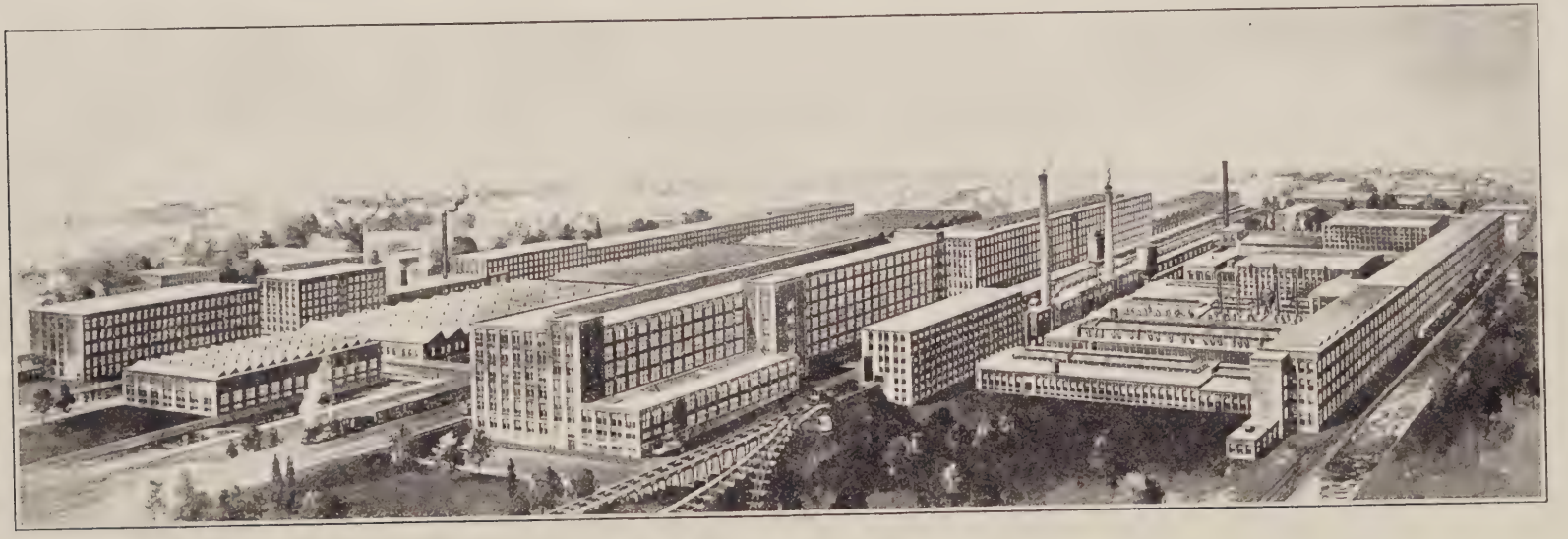
The next stage in development was the removal in 1888 to a one-story wooden building, with an equipment of two presses. Continual growth made necessary the purchase of a larger structure in 1900. Shortly after the purchase of these new quarters and before the company had an opportunity to move into the new quarters, Benjamin F. Perkins died, leaving the destinies of the company in the hands of his son. In the meantime, new lines were added to the company's products, most of them being paper mill equipment.

In the early '90s, J. Lewis Perkins purchased a small paper mill in South Hadley for the manufacture of calender roll paper. The limited production of calender rolls did not keep pace with the ability of the paper mills to produce that product and he later started the production of tissue paper to keep the paper mill busy.

The tissue paper business was continued as a department of B. F. Perkins & Son, Inc., until the incorporation of the tissue mills in 1906. At this time, the tissue paper business had developed to such an extent that it was necessary to segregate this business and the late J. Lewis Perkins



FARR ALPACA COMPANY, HOLYOKE, 1873



FARR ALPACA COMPANY, HOLYOKE, 1928

became the founder of the Japanese Tissue Mills, a consolidation of several paper concerns, and which was incorporated with $1,000,000 capital, and later became the American Tissue Mills, under which name it operates today in the manufacture of crepe, tissue and waxed papers.

While increasing constantly its production of calender rolls, the Perkins company entered such new lines as ventilating fans, paper and textile testers, etc. It was not until 1914, however, that it built its first textile calender. In the sixteen years since that date it has developed to a stage where it is an important factor in the building of bleaching, dyeing and finishing machinery. An idea of its growth may be gathered from the fact that whereas in 1886 Mr. Perkins was forced to secure endorsement on a note for $1,000, the company which he started now has plant buildings and equipment representing an outlay of $2,000,000.

Marking the half-century milestone in its progress from a diminutive machine shop to a large and complete organization for the manufacture of textile finishing machinery and other equipment, the concern erected, in 1925, a new and modern plant. Located on a thirteen acre site along the tracks of the Boston & Maine Railroad in Willimansett, adjacent to Holyoke, this factory comprises five mill units, uniform in appearance and equipped with every device for the efficient handling of the company's product. In addition there is ample room for further expansion and there is now in prospect the early erection of an additional building.

The new units already built and occupied include a cotton mill, 80 by 176 feet, four stories with a basement; a central building, 80 by 147 feet, two stories high; a machine shop, a storehouse, a press department building, 80 by 240 feet, one story in height, and a transformer station.

The Perkins unit has capital of $500,000 and employs 250 operatives, and the American Tissue Mills have authorized preferred capital stock of $500,000 and authorized common stock of $600,000. Upwards of 600 operatives are employed in the South Hadley and Holyoke plants.

B. F. Perkins, Jr., is president, J. L. Perkins, Jr., treasurer, and William F. Otto, clerk of the paper mill unit, and J. Lewis Perkins, Jr., is president, J. A. Perkins and John Oakley, vice presidents, and Frederick H. Rich, secretary, and John J. Duggan, treasurer, of the Perkins concern.

The present extensive plant of the Perkins unit was designed by Paul W. Bidwell, and many of the paper making and textile machines produced there were designed and invented by him, including the "Perkins Man Cooler," for the use and comfort of employees who work in highly heated departments. He also designed the Perkins embossing calenders and a variety of machinery for bleachery and textile finishing processes.

The founder of the business, Benjamin F. Perkins, was an inventor of note and it is interesting to record that one of the original Bell telephones was first demonstrated in his Holyoke shop, the apparatus, with the accompanying switchboard, being later sent to the original Bell Telephone Company, then located in New Haven, Conn.

Within recent years the Perkins Company, which has long produced the Mullen Tester for the testing of paper strengths, a device accepted and used by the Department of Commerce's classification board, and which sets the standard for new lines and brands of paper, has successfully extended the use of the system to include commodities other than paper.

Realizing that paint manufacturers were still relying on old-fashioned, inaccurate, expensive methods for testing their products, the Perkins organization set its experts studying the problem, with the result that an

accurate and inexpensive tester was produced that quickly measured the elasticity and bursting resistance of paint lacquer or varnish films.

Next the establishment turned its attention to foundries, which had been losing thousands of dollars yearly from faulty cores. Success is reported for this latest undertaking, a tester having been developed that quickly gives a finding of the bursting and shearing resistance of cores. Foundries are said to have given a very favorable report on the use of this device, and as a result of the broadened application of the system so long in use for power, the Perkins establishment is meeting with a largely increased market demand in this branch of its business.

In 1929 the concern reported its most active season in five years in its sales of textile machinery, and it produced a large quantity of bleaching and finishing equipment and calenders and calender rolls, as well as special machines for testing the strength and quality of paper, rubber and various fabrics.

That year some of the plant buildings in the Willimansett group were remodeled in order to increase the facilities for production. Some 3,600 square feet of storage space in the Willimansett plant were converted to manufacturing purposes, in order to enhance production. The company reported in 1929 an enlarged market for ventilating fans for industrial establishments, particularly in its "Man-Cooler," so exclusively used in steel mills.

In 1927 the American Tissue Mills took over the five story factory formerly occupied by B. F. Perkins & Son, Inc., when that concern removed to its new location in Willimansett, and with a view to meeting the increased demand for its products, the tissue unit erected a five-story addition between the main Perkins factory and the power plant, containing 50,000 additional square feet of manufacturing space. The paper company still operates, in addition to this new plant, the units at Stony Brook and Pearl City, in South Hadley.

For Holyoke these changes spelled more production and more employment. The company recently began the production of glassine paper and is operating three machines for the manufacture of glassine and waxed paper bags and envelopes to enclose napkins and tablecloths of its own manufacture and to outfit the shirt and collar trade. These machines turn out 800 bags a minute nine hours of the day. An additional machine for the production of crepe paper was installed, thereby increasing capacity in this line by approximately 1,000,000 pounds a year. Recent installations also included an additional waxing machine and a new three-color printing machine.

To produce 50,000 pounds of paper daily and convert this product into various useful articles, two paper mills and three converting plants are maintained by the concern, thus indicating that Holyoke companies are keeping up with the times and enhancing production in all lines.

WILLIAM SKINNER & SONS

William Skinner, a native of London, Eng., received a practical training in silk manufacture at the hands of his father, and came to the United States at the age of nineteen years determined that his technical knowledge and skill should be capitalized. At the outset, he entered the plant of the Valentine Dye Works, in Northampton. Two years later he became the junior member of the firm of Warner & Skinner, and began the manufacture of sewing silks in that city. In 1848, attracted by the excellent

water power facilities in Haydenville, in the town of Williamsburg, he built a small plant there where he produced sewing silks, and four years later he bought a water privilege and factory in the village which later became known as Skinnerville and in 1854 added silk twists to the line of production. Three years later he erected a three-story mill there, 80 by 30 feet, which he denominated as the Unquomonk Silk Mills, and the concern grew into one of the leading industrial enterprises of western Massachusetts.

Then came the fatal May 16, 1874, and the breaking of the dam at Williamsburg, five miles above Skinnerville, and he witnessed the sweeping away of his mills and houses by this raging, devastating, uncontrolled flood, nothing remaining in the village save his own house located on high ground, but even that was not immune from damage.

The disaster would have curbed the ordinary soul—but not that of William Skinner. Deciding to rebuild on a site which offered better power facilities, he selected Holyoke after mature deliberation, and the first unit of his new plant was completed in October, 1874—six months after the flood. There, at fifty years of age, he began the production of cotton back satins and silk and mohair braids, for which the Skinner concern has become internationally famous. Prosperity followed, the original mill was enlarged, and other units followed until today the plant is the largest of its kind in the world. In 1883 his sons, William A. and Joseph A. Skinner, were admitted to the firm, which became William Skinner & Sons.

From a comparatively few hands the total number of employees grew to 500, then to 2,000 in 1917, and today there are 2,500 on the payrolls.

In 1889 the business was reincorporated as the William Skinner Manufacturing Company, with a nominal capital of $100,000, William Skinner being president, Joseph A. Skinner, treasurer, and William Skinner, 2nd., assistant treasurer, William H. Hubbard, secretary. The father continued active in the company's affairs to the day of his death, in 1902.

He lived to see the concern of humble beginnings grow to a vast institution, and he witnessed immense quantities of raw materials converted into a steady stream of satin dress goods, linings, taffetas, mohair braids, sewing silks and twists that poured out through the shipping room to every corner of the world. Offices are maintained in New York, Boston, Philadelphia and Chicago.

Having profited through Holyoke's splendid manufacturing facilities, he was lavish in his rewards, continually giving to the city's institutions, improving the conditions of the unfortunate, becoming the largest contributor to the City Hospital, assisting the House of Providence Hospital, deeding a site for a Y. M. C. A. building, and contributing largely to its erection, building practically with his funds alone Grace Church, subscribing $10,000 to the public library fund, giving generously to Mount Holyoke, Vassar and Smith colleges, equipping the gymnasium at the Moody School, in Northfield, and becoming a generous patron of art and music.

Due to a progressive and continuing program of national advertising, the horizon of distribution of the products of this progressive concern has been vastly enlarged within recent years, and it is interesting to observe that the two largest textile units now operating in the city—the Farr Alpaca Company and William Skinner & Sons—came into being within a few months of each other and after more than fifty-five years are bigger and busier than ever before in their respective histories.

THE NEWTON PAPER COMPANY

The Newton Paper Company, incorporated in 1875 by James H. Newton, has been for many years a producer of building papers and of special papers for leather manufacturers. A large part of the business is the production of mill wrappers for the paper industry.

The company employs upwards of 100 operatives, and has capital of $72,000. Henry L. Russell is president and Herbert B. Newton, treasurer and secretary.

HEGY'S, INC.

In 1878, Theobald A. J. Hegy established a cleansing and dyeing plant in Holyoke, which, in 1919, was incorporated by him and his four sons as Hegy's, Inc., with T. A. J. Hegy as president, John B. Hegy as vice president, Frank J. Hegy as treasurer and general manager, and George S. Hegy as clerk. A modern, sanitary, fireproof and scientifically equipped plant was later erected, and stores are maintained in Holyoke, Springfield, Northampton and Westfield.

From a small beginning it has become the largest establishment of its kind in western New England, the present plant being equipped to handle not only garments, but rugs, household furnishings, upholstery and furniture. The methods include the cleansing of all kinds of textiles.

THE BUCHANAN & BOLT WIRE CO.

The Buchanan & Bolt Wire Co. was organized in 1878 by Robert and Andrew Buchanan and John Bolt.

Robert Buchanan and his son, Andrew, were connected with the DeWitt Wire Cloth Company, of Belleville, N. J., and about 1876 became identified with the Morse & Whyte Company, of Boston, in the manufacture of paper machine wires, commonly termed Fourdrinier wires and when they started business in 1878 they purchased much of the machinery of the latter concern and took into partnership John Bolt, who had been with the DeWitt unit.

Located in a paper making center and operated by practical wire-cloth makers the business was a success from the start and soon ranked among the leaders in production and quality of paper machine wires and dandy rolls, which reputation it has steadily maintained.

Robert Buchanan died in 1894, and Andrew Buchanan two years later, at which time the business was incorporated with John Bolt as president and treasurer and G. E. Buchanan, secretary. In 1900 John Bolt retired and G. E. Buchanan became president. Robert Buchanan, a grandson of the founder, was made treasurer and general manager, and George Craig, who had been with the firm since the year of organization, was chosen secretary and general superintendent, and these are the present officers of the company.

The company is capitalized for $50,000 and employs sixty operatives.

THE SMITH TABLET COMPANY, INC.

Holyoke's first tablet manufacturer was The Smith Tablet Company, Inc., established fifty years ago, and now recognized as a leading purveyor to public and private schools of tablets, pads, composition books, school papers, stenographers' books, special ruled and folded papers, papeteries, binders, loose leaf books, typewriter papers, examination blanks, boxed

papers, note books and fillers, the concern converting paper and literally dressing it up for use as stationery.

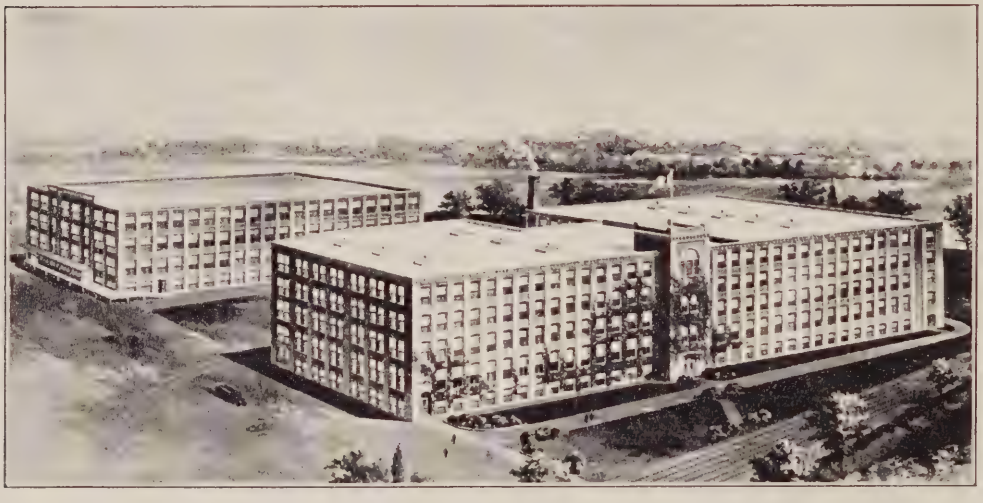
In 1925 the company was purchased by B. Hopper of Kalamazoo, Mich., and added to his several units. Early in 1927 the interests controlled by him and those managed by William Albrecht and W. W. Sunderland combined and formed the Western Tablet & Stationery Corporation, with the home office at Dayton, Ohio. This combination included very many companies, but they were condensed to five. Later the corporation bought the Reynolds & Reynolds Company of Dayton, and the five merged divisions make up the largest corporation in the world engaged in manufacturing stationery, the concern being to that trade what the United States Steel Corporation is to the steel industry.

The new corporaion decided that it was essential to success to operate a division in New England, and the Holyoke plant was modernized and improved.

Some seventy-five operatives are employed and the company has capital of $125,000. Francis McSherry is president, treasurer and secretary of the corporation.

THE NATIONAL BLANK BOOK COMPANY

In 1943 the National Blank Book Company, of Holyoke, will observe the centennial of its inception. For considerably more than three-quarters of a century the concern has kept pace with the record-keeping requirements of a great nation.



NATIONAL BLANK BOOK COMPANY, HOLYOKE

During that period, like everything else in the modern business world the development of record-keeping methods and equipment has been revolutionary.

Today typewriters, bookkeeping machines, and modern record-keeping equipment are to the record-keeping world what the telephone, radio, automobile, railroad, ocean transportation and airplane are to the world at large.

It was during that epoch-making period that the Holyoke concern by honest craftsmanship, progressive ideas and a square business deal, attained its tremendous growth.

Like many another up-to-date Massachusetts enterprise of today, the National Blank Book Company had its humble beginnings in another state. From a small unit, established in New York City in 1843, it removed from the Empire State, in 1881, and took up its abode in a modest factory, on Cabot Street, Holyoke, where now stands the building of the Crocker-McElwain Company.

Several years later Treasurer F. B. Towne became the active head of the concern. Later two brothers, President E. S. Towne and Vice President J. M. Towne, joined the company, and with Richard P. Towne and Herbert S. Towne, sons of F. B. and E. S. Towne, respectively, make up the five heads of the concern.

It was not long before the small concern began to be constantly bothered by "growing pains." In 1891, all the departments had expanded so rapidly that additional space was provided in the east and west wings of the building.

By 1897, the Cabot Street mill proved altogether too small, and the next year a large modern structure was erected at Riverside, and is the present home of the company.

In 1906 and in 1912 additions were built. Since then from time to time other extensions have been made, until the present building has a total area of 189,000 square feet.

In 1929, following a year of phenomenal growth in production and sales, the company erected a five-story fireproof addition, costing $100,000, fronting on the main building, facing the Boston & Maine Railroad tracks, and containing 27,500 square feet of manufacturing and office space.

On the ground floor is located the leather department, where material is prepared for covers, backs and corners for the diverse line of books made to enclose business records. On the second floor are the offices directly related to the manufacturing operations, including costs, estimates and supervision of various departments. The third floor provides quarters for the bindery and inspection department for both the bound and loose leaf divisions. The fourth floor houses the superintendent's office, maintenance department and research laboratory, while all of the fifth floor is used for the printing department, located adjacent to the ruling department.

About twenty-two years ago the concern, realizing that loose leaf accounting equipment was fast becoming a most important factor in accounting, began the manufacture of loose leaf devices, and the growth was so consistent in this division that it was necessary in 1920 to erect a separate mill to take care of the fast-growing demand. The new loose leaf building is located a short distance from the main plant and is 80 by 180 feet and four stories in height.

The company maintains branches in New York City, Chicago, Philadelphia, Boston and in London, England, and is capitalized for $1,100,000, employing 800 hands.

J. & W. JOLLY, INC.

In 1881 James and William Jolly established the machine firm of Jolly Bros., which later was incorporated as J. & W. Jolly, Inc. In their foundry there were manufactured for years, under a royalty, the McCormick water wheels, and later elevators.

That the spirit of inventive genius is as virile in this plant today as it was nearly a half century ago is shown by the fact that during the past three years the volume of the Company's business has been substantially

increased by developing the production of machinery used in the manufacture of automobile tires, including both light and heavy equipment, and of iron, steel or aluminum as may be required. Improved types of machines for various production operations are embraced by this line. Among the principal companies served is the Fisk Rubber Company of Chicopee Falls, for which much equipment is being produced under Fisk patents.

It is estimated that tire-making machinery amounts to approximately one-third of the production of the company at present, which is employing a full force and has been operating nights. The 1928 fiscal year was the most successful experienced for some time by the concern, which has greatly improved its production facilities since the plant was partially destroyed by fire about three years ago.

Prominent in the paper-mill equipment produced by the concern is the static neutralizer, known as "Stat-Erad," a contrivance for removing charges of static electricity from paper and other flat materials used in printing and manufacturing, and which can be attached to printing presses, calenders of paper machines, paper cutters and ruling machines.

Where paper or other material delivered from a machine curls or sticks or fails to pile smoothly on being cut into sheets, the effect is to waste more or less material while interfering with rapid production. This trouble is overcome by a static neutralizer.

"Stat-Erad" consists of a rod on which is mounted the conducting elements made of flat brass chain with light wire fringes or fingers. The rod is mounted in a tube having an insulated covering, the tube being slotted its entire length to allow chain and fingers to hang through. The whole is mounted at both ends in insulated bearings, and with no moving part. The rod is provided with a handle on one end and rotates within the outer tube, and the adjustable conducting chains may be lowered to come in contact with the paper, but without smearing the printed page. When the apparatus is attached to a printing press it is so placed that the sheet will come in contact with the current after it has passed the cylinder and before reaching the delivery platform. As delivered the device is equipped with transformer, rheostat, insulators and high tension cable.

The company manufactures an oscilating screen for removing dirt from paper stock before it goes to the paper machine, and also makes a line of standard paper mill equipment, including jordan engines for refining paper stock, pumps for moving paper stock from the stuff chest to the jordan engines and paper machines, bleach drum-opener, and blue-spot machine.

For many years J. & W. Jolly, Inc., has maintained a machine shop for service and repair work for paper and textile mills in Holyoke and vicinity.

The products of today consist of paper-mill machinery. The concern is capitalized for $100,000, and employs seventy-five operatives. William J. Jolly is president, Martin L. Cramer, treasurer and general manager, Arthur H. Burgess, assistant treasurer, and W. J. Agambar, secretary.

THE HOLYOKE BELTING COMPANY

The Holyoke Belting Company was organized in 1869, in Chicopee, where it remained until the eighties, when it was removed to Holyoke at the time B. F. Nichols & Co., purchased the concern. It was incorporated as the B. F. Nichols Belting Company, in 1891, and four years later the name was changed to the present designation. Originally, the production

was confined to roll covering, but as the belting line grew this was finally dispensed with. Increase in sales was responsible for three removals, each time to larger quarters, and it now occupies a four story building, 100 by 60 feet, equipped with the latest designed machinery, and specializes in waterproof leather belts, in which type of production it was one of the first in the United States to engage.

It also carries on an extensive business in special belts for the textile trade, particularly silk mills, its commodities being sold largely throughout New England, the middle states and the South.

The leather belt business is holding its own despite the new electric chain drives introduced in many factories, and has been maintained in substantially the same volume, for a number of years past being well above the pre-war level. As in most lines of factory equipment, the period starting with the latter part of 1920 brought a temporary slump, but recovery came in due time, as after every depression.

It is the smaller belts, which are very numerous and are replaced more often than the larger belts, that constitute the main dependence of the manufacturer of belting, and the general growth of industrial operations in recent years has kept up a good demand for the product, while improved methods of production have been a big help in economical fabrication and prompt filling of orders.

One factor that is said to have been of immense value in conserving the supply of leather suitable for belting, is the shift from leather to woolens and mohairs for automobile seat covers and body linings. It is not generally known that the heavy leather suitable for a factory belt can be split up into excellent material for automobile use, when fashion prescribes. But the substitution of artificial leather and the preference for textiles, induced in part by the advanced price of hides and leather, has saved the belting industry from severe competition, enabled an adequate supply of good leather to be bought for the last named purpose and generally exerted a stabilizing influence on the industry.

The company owns and occupies one of the best equipped and most up-to-date belting plants in the country, and has capital of $100,000. T. W. Kirkland is president and general manager, O. B. Smith and P. J. Slowey, vice presidents, O. B. Smith, secretary, and H. E. Hanks, treasurer.

THE HAMPDEN GLAZED PAPER AND CARD COMPANY

The Hampden Glazed Paper & Card Company was promoted by G. F. Fowler in 1881. That year, soon after the equipment had been secured and manufacturing had commenced in the Old Mount Tom Paper Mill, then owned by the Parsons Paper Company, T. H. Fowler joined his brother in the management of the concern. Later, N. N. Fowler joined G. F. and T. H. Fowler in the business.

In the fall of 1882, the land upon which the present buildings stand was purchased from the Holyoke Water Power Company, and the erection of the first section of the present mill was commenced. This original structure was a small brick two-story affair, and was completed in 1883, when actual manufacturing started in the new location.

Some years later, R. P. Fowler was called to assist in promoting the firm's business which had been growing steadily from the start and was expanding rapidly in the manufacture of all kinds of specialty papers.

The first building has been materially enlarged during the course of

the past forty-five years, in order to care for the constantly increasing production.

Glazed papers and card-boards were originally manufactured, but as time went on many other lines were added, due to changes in demand, until today the output is made up of thousands of different kinds of paper, board, and cover stocks, including hundreds of original and attractive fancy box covering papers.

Since the World War the company has been one of the leaders in advancing the manufacture and consumption of fancy decorative cover papers for box coverings, as well as for envelope linings and fancy wrappers.

Upwards of 200 operatives are employed. George F. Fowler is president, Norman N. Fowler, vice president, and Ralph N. Fowler, treasurer and secretary, and the corporation has capital of $56,000.

THE JUDD PAPER COMPANY

In December, 1882, John K. Judd founded the Judd Paper Company, renting desk room only at the start, but after a few months William S. Stedman joined him as a partner and larger quarters and a small warehouse were leased.

In 1890, the company was incorporated, by Messrs. Judd, Stedman, and Alfred T. Judd, with capital stock of $24,000. Nine years later, Mr. Stedman and Alfred T. Judd retired and shortly after, two sons of John K. Judd, who had been learning the business, became officials of the company, and since that time up to the present John K. Judd has been president, Clifford K. Judd, secretary, and Philip M. Judd, treasurer.

From a modest beginning the business has steadily grown and larger quarters were necessary from time to time. In 1891 the company erected a four-story and basement building, 55 by 90, in which they occupied only the first floor, the balance being rented to Smith & White, (later to become White & Wyckoff Manufacturing Company), which concern was just starting on its career. Later Smith & White put up their own plant and the Judd Paper Company gradually extended its business until it occupied the whole building. In 1909 it bought adjoining property and erected a structure devoted entirely to office requirements, and in 1920, the capital stock was increased to $96,000.

In 1921 a disastrous fire wiped out both buildings and contents. The American Writing Paper Company offered the Judds the use of a large room with desks, typewriters and supplies, which was accepted, and within three hours from the start of the fire business as usual was being carried on and within a week commodious quarters had been secured, which were occupied until 1924.

A new building was erected that year, the last word in design and construction and especially adapted to the needs of the company, consisting of three floors and basement and occupying a plot of land 100 by 100, with ample space on one side to accommodate trucks in the receiving and shipping departments. The first floor is given over to open stock and to the shipping department. The offices occupy about 5,500 square feet of the second floor. Washed air gives perfect ventilation and acoustic treatment of the ceiling eliminates much of the usual office noises. The balance of the building is used in storing a large stock of paper in cases and bundles.

Many years ago it was customary for the company to send its salesmen on long trips as far west as Denver, but now all are located in the larger cities of New England and New York State, where they can render

better service. While the salesmen are located in nearby territory the company does a large mail order business in the more distant parts of the United States and Canada, dealing in all kinds of paper and especially catering to the needs of those who demand something out of the ordinary.

From a modest beginning, with a personnel of one, the company has enjoyed a steady growth until at the present time it has a staff of thirty-five, with representatives in a dozen strategic centers, and it employs capital amounting to $96,000.

THE AMERICAN PAD & PAPER COMPANY

The American Pad Company began business in 1884 in a small way in one room on the second floor of a Main Street building, and two years later it moved to another location where it occupied three rooms on the fourth floor of a business structure.

In 1888 the business was incorporated as the American Pad & Paper Company, and by 1894 it had outgrown its quarters, which then consisted of the two upper floors or eight large rooms, which were used for manufacturing and storage purposes, and two office rooms. In 1895, land was purchased and the main brick building, 66 by 123, four stories and basement was erected. A few years later the company found itself in need of storage facilities and additional land was bought and a one-story frame storehouse, 66 by 123, was built. In 1910, desiring to extend its manufacturing department, a brick addition, 50 by 81 feet, four stories and basement was added to the main building, the frame storehouse moved farther north and a covered shipping platform built along the track of the Boston & Maine Railroad, connecting the storehouse with the main building.

The plant is equipped with the latest and best machinery and has ample storage space where it carries not only an abundance of raw materials but a large stock of finished goods.

The company features its efficiency line of commercial stationery and has a large force of skilled workers in its employ, many of whom have been with it for years, one male employee having some forty years to his credit. A large corps of traveling salesmen cover the country from coast to coast.

C. H. Taber is president; G. W. Brainerd, treasurer; C. A. Chase, vice president and sales manager, and F. H. Cook, clerk, of the corporation, which has capital of $150,000, and employs 100 operatives.

THE COBURN TROLLEY TRACK MANUFACTURING COMPANY

In 1886, Lemuel Coburn invented the trolley track, now extensively used in all sections of the United States, and received a patent on it the following year. The Coburn Trolley Track Manufacturing Company was incorporated, in 1888. Two years later a large tract of land was purchased at Willimansett, where a factory was erected, and other lines were added, including rolling store ladders for shoe and hardware stores and factories, and overhead carrying system for all types of industrial plants, fire-proof doors, frames and trimmings, including sliding door hardware for garages, bus stations, industrial plants, and airplane hangars. The company markets its products abroad, and, in 1928, observed the fiftieth anniversary of its incorporation. Capitalized for $650,000, it employs upwards of 150 workers.

A. A. Coburn is president, W. D. Ballard, vice president, W. I. Ballard, treasurer, and H. E. Ballard, secretary.

THE HOLYOKE FOUNDRY COMPANY

The Holyoke Foundry Company was established in 1887, by Munn & Baush to make machine tools and was owned by that firm until it moved to Springfield. It was then purchased by Edward T. McHugh, who operated it as the McHugh Foundry Company, until March, 1920, when it was sold to interests connected with the Holyoke Heater Company, whose rapidly growing business required a foundry.

It does a jobbing business, as well as furnishing all the castings for the Holyoke heaters, and it has a capacity of ten tons of No. 1 grey iron castings per day. The company has capital of $30,000, and employs fifty operatives.

George C. Gill is president, P. S. Sinclair, vice president, Charles S. Muir, secretary, and L. B. Smith, treasurer.

THE WHITE & WYCKOFF MANUFACTURING COMPANY

In addition to the many establishments actually manufacturing paper, Holyoke contains a large number of converters. Among the leaders in this line is the White & Wyckoff Manufacturing Company, capitalized for $2,500,000, and employing from 650 to 800 operatives, the number varying with seasons and conditions.

Its products comprise papeteries or boxed social stationery, writing tablets, greeting cards, envelopes, typewriter papers, and manuscript covers, which have a wide field of distribution.

At its start in 1889 the concern was known as the Smith & White Manufacturing Company, being a partnership composed of F. D. Smith and E. N. White. J. L. Wyckoff joined the organization in 1891, his attention being devoted chiefly to the sales end of the business, while the financial end was in charge of Mr. White and the manufacturing was cared for by Mr. Smith. In 1893 the latter's interest was purchased by the other two members and the present corporation was formed.

Starting with eight employees in a small one-story building, the concern now has three plants with combined floor space of more than seven acres and employs in the vicinity of 900 operatives.

The officers include: President, J. Lewis Wyckoff; treasurer and chairman of the board, Edward N. White; vice president and general manager, George R. Burkhardt; vice president in charge of development, Henry J. Toepfert; vice president and manager, Chicago Office, Peter Peterson; assistant treasurer and controller, Forrest R. Gee; manager Davenport division, Harry F. Burkhardt; director of sales promotion, Albert H. Sampson; general superintendent, Paul W. Bidwell.

The entire enterprise actually performs all the operations necessary to produce boxed writing papers as well as their other products, fabricating everything but the paper.

The company operates the largest private printing plant in Holyoke and one of the largest in New England. Close to fifty presses of various kinds are necessary to take care of this part of the production.

In 1928, after three years of experimentation and development the company placed on the market an improved envelope lining machine, which is said to possess definite advantages over older devices and methods. The machine was developed because of the opinion held by executives of the concern that the apparatus hitherto available to the trade could be improved in speed, accuracy and elimination of waste. The device is said

to produce from 35,000 to 45,000 lined envelope blanks per day with an unusually small percentage of waste.

With branch sales offices maintained in New York, Philadelphia, Chicago and Toronto, twenty traveling representatives covering the country from coast to coast, and selling agents in the principal commercial centers abroad, the distribution of the company's products is well nigh universal.

Incidentally, the development of the company also illustrates in a remarkably clear way the progress and demands of the times in the matter of a very ordinary and every day need—writing paper. Forty years ago the wants of the American people in this respect were surprisingly limited and simple. Today, people insist on having all manner of shapes and styles in paper. As a consequence, the industry has broadened in scope until variety and changing style of product are an important feature of the manufacturing process.

THE EUREKA BLANK BOOK COMPANY

In 1890 the Eureka Ruling and Binding Company was organized with $10,000 capital, which was increased by 1907 to $55,000, and, in 1914, the assets were sold to a new company incorporated under the name of the Eureka Blank Book Company, with $20,000 capital, since reduced to $150,000, and its specialties are gummed and fancy papers and sealing tape. It operates, in addition to its Holyoke plant, a branch unit at South Hadley Falls, and employs 150 operatives.

H. D. Honey is president, M. J. Judge, treasurer, and J. C. Shea secretary, and its Boston office is at 950 Park Square Building, in charge of Gilbert I. Holmes.

THE BARLOW AND VAN VALKENBURG COMPANIES

Forty years ago Thomas F. Barlow founded the business known as the Barlow Company, which at present is owned and operated by F. J. Bayon, as president, G. P. Hosmer, as vice president, A. H. Adelson, as treasurer, and H. E. Graves, as secretary.

During all these years it has manufactured display fixtures, and at all times has not only been abreast of the times, but has anticipated the peculiar demands of the trade. The trend in recent years for modernistic designs has had a pronounced effect on styles of store window fixtures, but no concern in the country has built products more distinctive of the modern school of art than this Holyoke enterprise. Angles suggestive of the futurist school have replaced curves and square tubing has given way to round in the formation of metal window display structures.

The trend has been even more radically in favor of bronze rather than wrought iron, and as the preference has come for two-tone effects, such as silver and black, the Barlow Company has met it through its plating department,—one of the largest in New England—where every modern effect in nickel, bronze, brass and copper is carried out. Polychrome Swedish and fancy bronze fixtures have been designed and executed and the concern numbers among its many customers some of the leading marts of Fifth Avenue and Michigan Avenue.

The L. D. Van Valkenburg Company, whose plant is at Willimansett, was established in 1896, and was incorporated in 1920, with capitalization of $80,000. The company employs about forty hands in the production of pen, pencil and paper clips and also does metal stamping, hardening and tempering and operates a job printing plant.

William Halket is president, and W. L. Van Valkenburg treasurer and secretary.

THE PROGRESS OF THE C. F. CHURCH MANUFACTURING COMPANY

In 1898 the C. F. Church Manufacturing Company, was organized to manufacture all types of bathroom equipment, covered with white pyralin sheeting, a process developed by the concern at that time. The commodities consisted of medicine cabinets, sanitary commodes, bathroom costumers, towel racks, and, in fact, anything that could be covered with the white sheet material. Toilet seats were produced, but the average production of these articles by the six original employees was only about fifteen a day. Progress was moderate until the present management assumed charge of the company, in 1919, at which period the production of toilet seats was about 100 a day, a rate then considered a very satisfactory volume of business.

One of the first decisions of the new management was to discontinue the manufacture of all items, with the exception of toilet seats, and sales efforts including national advertising were at once set in motion, and a policy of establishing sales branches in Metropolitan centers was inaugurated. In 1920 the increase in business was such as to make necessary the erection of a branch factory, in Brattleboro, Vt., in order to be near the source of lumber, and by that year 100 employees were carried on the roll, while production had been increased to about 300 seats and covers per day.

Today, 450 persons are employed, and the daily production of seats and covers is 3,000, while sales offices are maintained in 26 cities, where a staff of forty-five men is carried, with twenty-six representatives of the company operating in the foreign field. The corporation has capital of $1,500,000.

In 1920 the company's sales were approximately $100,000. In 1928, they reached the imposing total of $2,500,000. Here again one finds what Yankee ingenuity can do in the manufacturing field in the short space of nine years.

In 1929 the company purchased the American Radiator & Standard Sanitary Corporation, of New Brighton, Pa., and closed that plant, removing the equipment to the Holyoke unit. It also began that year the production of pyroxylin-covered sink drains, and it now operates not only the Holyoke and Brattleboro plants, but a third unit in Wadington, N. J. The company's 1928 output ran 40 per cent ahead of the 1927 total, due in part to the purchase by the Church concern of the toilet seat division of the B. O. T. Manufacturing Company, of New Jersey, and in 1929 sales of the Holyoke corporation were 16 per cent more than those of the previous year.

The officers are: Otto Kolstad of Holyoke, president; Richard A. W. Witherell of Springfield, treasurer and general manager; Bert O. Tilden of Trenton, N. J., vice president; and Clifford S. Lyon of Holyoke, secretary.

THE AMERICAN WRITING PAPER COMPANY

The largest manufacturer of fine papers in the world,—the American Writing Paper Company,—not only has its headquarters in Holyoke, but sixteen of the twenty-six original plants that entered the merger in 1899 are located within the peninsula area formed by the majestic Connecticut River. The fifty-four paper-making machines operated by the



COMPOSITE VIEW OF THE PLANTS OF THE AMERICAN WRITING PAPER COMPANY, HOLYOKE

concern produce 288,000,000 pounds of paper annually, and there are 87.3 acres of floor space, or 3,792,042 square feet in the plants. The corporation burns 150,000 tons of coal a year, requires 21,000 horse power to operate its machinery, of which 10,000 is permanent water horse power, and it uses 18,720,000 gallons of water daily.

Interesting itself in standardization and simplification the company has reduced the 2,000 or more brands of commercial paper it formerly made to forty-five primary lines, and, in addition to arranging service houses in the principal cities of the country, it has established branch offices in New York, Chicago, Philadelphia, Washington, San Francisco, and Mexico City, and through representatives in foreign countries it carries on an extensive export business.

It has divided its plants into two groups—the fine paper mills making high-grade commercial bond, writing and blue-print papers, papeteries and similar types and the coarse paper mills, producing book and cover papers, bristols, envelope papers and a variety of specialties.

The Albion Mill unit, the outgrowth of a one-machine wooden mill, formerly owned by the Hampden Paper Company, began its history in 1869, and for many years produced paper from which paper collars were made. By 1879 this unit had three machines and manufactured book, envelope and engine-sized papers, and specialties.

The Beebe & Holbrook unit was founded in 1871, by Messrs. Beebe & Holbrook, a partnership which continued until the death of Mr. Beebe in 1878, when a corporation was formed. In 1886 the plant was enlarged, at which period it was considered to be the finest type of paper mill construction in Holyoke. When the merger came in 1899 the adjoining Massasoit Mill was absorbed, and consolidated with the Beebe & Holbrook Division, and the four machines of these units have a yearly capacity today of 15,000,000 pounds of paper.

The original Crocker Mill unit, built in 1860, was a one-story structure, with basement, and was owned by the Messrs. Newton, although operated under the name of the Hampden Paper Company. It largely produced paper for paper collars during Civil War times, changing later to cover papers and when the Messrs. Newton withdrew in 1867 the name was changed to Crocker Manufacturing Company. In 1880 C. A. Crocker entered the concern and the mill was enlarged in 1895. New machines were installed and the unit enjoyed a wide reputation for its specialties, which have been continued since the merger.

In 1880 George R. Dickinson built the Dickinson Mill, which was originally equipped with two machines to manufacture book papers. Eight years later, upon the death of the founder, his son, Henry S. Dickinson advanced the interests of the concern and in 1890 several additions were made, a third paper machine being added, which produced a sheet 110 inches wide—then the largest piece of paper fabricated in Holyoke.

The Gill Division, now one of the largest units, bore the name of Winona for many years, being built in 1881 by D. H. and J. C. Newton, The plant was the first in Holyoke to be erected on the "hollow square" plan, which simplified the process of manufacture. From the date of the merger in 1899 to 1916 the American Writing Paper Company operated the plant with the equipment which was carried at the time of purchase, but in the latter year, the mill was completely remodeled and a 152-inch Fourdrinier machine was installed, which produces a sheet 140 inches in width—the largest piece of paper now made in Holyoke.

The Holyoke Paper Company division is closely associated with the

early attempts at paper-making in the city, having been built in 1857, and the original concern having been the first in the United States to take up to any extent the linen-finishing process. At various periods, William Whiting, Stephen Holman and C. H. Heywood were associated with this plant, and in 1866 Messrs. O. H. and O. S. Greenleaf bought it and during the next three decades steadily added to its equipment, and increased its capacity.

The Linden Paper Company unit was built in 1892 and from the outset its founder, J. S. McElwain, won a reputation for making high grade writing paper. Equipped with two 98-inch Fourdrinier machines it has a productive capacity of fifteen tons a day, and in 1917 a Barber air-dryer was added to the equipment—the only one in operation in a Holyoke plant.

The Mt. Tom Paper Company division, formerly the Nonotuck, was formed in 1880 by J. S. McElwain, who was the first president, W. H. Heywood, who became treasurer, and H. D. Bradburn, who was the first general manager. It began production on November 20 of that year, as a one-machine plant, and two years later a second machine was installed, while in 1895 size-tubs and loop-drying machines were added. In 1898 the plant was sold to A. W. Esleeck, who formed the Esleeck Manufacturing Company, but the following year he disposed of the plant to the American Writing Paper Company, and removed to Turners Falls where he bought an idle plant.

The Nonotuck Paper Company division was erected in 1881 by the Syms & Dudley Paper Co., but in 1892 the original Nonotuck Paper Company acquired the plant and designated it as Nonotuck No. 2 to distinguish it from its original mill, now known as the Mount Tom unit. At the time of the merger it was equipped with 72-inch and 82-inch machines, and it was then producing coated book papers, which were discontinued by the new corporation. The American Writing Paper Company enlarged the engine and finishing rooms, and installed two 122-inch machines, which increased production from fifteen to thirty tons of paper a day, and it manufactures envelopes, fine and book papers.

The Norman Paper Company division was built in 1891, but did not begin production until 1893, James H. Newton, the owner of the Wauregan Mill, being at the head of the enterprise. Two 86-inch machines were originally installed, but in 1905 one of these was replaced by a 116-inch machine.

The Parsons Paper Company division built in 1853, was owned by J. C. Parsons, Col. Aaron Bagg and J. S. McElwain at the time of the merger and it had been successful from its inception, the business requiring not only several additions to the original plant, but also the erection of a new mill, known as Parsons No. 2, the latter not being absorbed, when the merger took place.

The Riverside Paper Company division comprises four adjoining mills, the first having been built in 1866, when a 70-inch machine was installed to manufacture fine paper. Following the close of the Centennial Exposition, at Philadelphia, in 1876, an 80-inch machine that had been displayed there, was added, and large quantities of envelope paper were turned out by it.

The Wauregan Paper Company division was established in 1879 by James H. Newton, and was equipped with an 86-inch machine, the early production being book paper, which in 1885, when a size-press was added, was changed to tub-sized writing and envelope papers.

AN 87 ACRE PAPER PLANT

Probably nothing that has transpired industrially in Holyoke in recent years has so heartened her citizens as the "comeback" of the American Writing Paper Company. During 1926 and 1927 vital changes in the management of policy of this, America's greatest writing paper unit, were in progress, and definite stability has come out of apparent chaos under the skillful direction of President Sidney L. Willson.

Just what attracted him to the idea of rejuvenating the American company is not known; what is apparent to all the paper trade is that he put his whole heart and soul and almost tireless energy into the work. The present condition of the company is a testimonial to the value and effectiveness of that work; and Holyoke owes him a debt of highest gratitude, for stabilizing and placing its chief industry on a high financial basis.

The story of his part in reviving "the imperial industry" as papermaking has been termed, is modestly told by President Willson in these words:

"During the last two or three years there has been considerable comment and publicity given to New England industries, and the question has frequently been asked, 'What's the matter with New England?'

"This has been answered in various ways, but possibly the best answer is to take concrete examples of some of the industries which were supposed to be retrograding, if not disintegrating, and see what has been accomplished through the application of present-day methods of successful management.

"An outstanding illustration is the American Writing Paper Company, Inc. In 1899 there were brought together thirty-three units manufacturing a variety of high-grade papers and paper products under one company, known as the American Writing Paper Company. This company was organized during a business period when combinations were being formed and with the idea of profits being made in the stocks as well as in the merchandise. The company at that time controlled practically 70 per cent of the fine paper business of the country and from 75 per cent to 80 per cent of the fine paper business in the eastern section of the country, which created a feeling of security and assurance of its prosperity.

"A condition of this kind usually results in laxity of business methods with the development of outside competition. This evidently is what took place, for within a short time many of the former executives of the unit mills left the new company and organized competitive companies, all of which took business, and gradually the tonnage made by the new company was curtailed and the expected profits from its operation were constantly being reduced.

"Its strong position in the industry made it possible even under these conditions to pay interest on its bonds, but during its twenty-five years of existence it paid only 6 per cent on its preferred stock, with nothing on its common stock.

"During the war period it was like all other companies, in position to show large earnings, part of which were used in reducing the amount of outstanding bonds, but immediately after a slump in the fall of 1920 the company each year lost large sums of money. As a result, in October, 1923, the company went into receivership.

A WONDERFUL RECORD

"The receiver, having had over thirty years' experience in the paper business and having acquired a fairly intimate knowledge of all grades of

papers and methods of merchandising, with a large acquaintance in the industry among the manufacturers and merchants, and with up-to-date ideas regarding the conduct of the business, selected an entirely new organization—picking men here and there who were specialists in the particular branches of the operations of the company and who had long and successful experience in those lines. The new organization immediately applied the up-to-date methods, and during the receivership period of four years made a record which impressed the former security holders and bankers, and which prompted them to favorably consider a reorganization of the company.

"During the receivership period, while the company was operated at a loss, if its interest obligations were considered, it so greatly reduced the losses that it was able, exclusive of the bond and note interest, to operate at a profit and to conduct its business without borrowing money, and at the same time paying all of the receivership obligations at maturity. It was necessary, however, for the receiver to borrow a sum of money to pay taxes which had accrued prior to receivership, but in every other respect, the operations of the company were conducted at a profit.

"In March, 1927, this reorganization was completed and the American Writing Paper Company, Inc., began business. Since that date the company has operated at a profit over and above its obligations on the bond interest and serial notes. Its financial structure is strictly upon an industrial basis. Its current assets as compared with its current liabilities are between eight and nine to one. In the old company, the good will was placed at $18,000,000. In the new company, it stands on the books at $1. Every obligation is met at maturity, and the company is steadily improving its condition.

"During the receivership period and up to the present there has been spent on maintenance and rehabilitation approximately $3,500,000. The Mills today are in better condition than they have been during the past ten years, and money is being constantly spent for rehabilitation.

"The new company was organized with sixteen mills, of which fourteen are located in the city of Holyoke, with one mill at Unionville, Conn., and another at Windsor Locks, Conn.

"A program of concentrating the business into a fewer number of mills has been carried out, which has resulted in lower costs, better qualities—with more steady work for its employees. These improved conditions have resulted from:-

"1. Selection of competent, experienced men as superintendents, who are not only skilled in their particular branch of the industry, but having as well executive abilities to organize competent assistants, and control their operations in securing beneficial results.

"2. From an intensive study of the human factor in business,—this being one of the most important, if not the most important factor in business today.

"3. In being able to restore and retain good will toward the company which is evident from the steadily increasing business of the company.

TEN CARLOADS OF PAPER MADE EACH DAY

"The company today is manufacturing daily approximately 250 tons of high grade papers, which means approximately ten carloads of 50,000 pounds each, leaving Holyoke for all parts of the country. It is an interesting fact that for every one carload of paper shipped, the company

receives four carloads of raw materials, which means a total number of cars in and out of approximately fifty cars daily.

"In the conduct of its business a budget system of control in all branches is in operation, a careful analysis of marketing possibilities in different sections of the country, a careful control of costs as compared with operations, and economies through all of its departments have brought about a result which is considered very commendable by those having knowledge of its affairs."

The corporation employs under normal conditions in and out of Holyoke from thirty-five hundred to four thousand men and women, and has an annual payroll of between three and one-half and four million dollars, and it pays over $200,000 a year in taxes.

In 1928, the erection of a new stock house, the alteration of the interior arrangements of some of the mills and the installation of new equipment resulted in expenditures for rehabilitation, plant additions and betterments the sum of $768,556, and for maintenance and repairs $402,564, a total of $1,171,120. An increase of 86 per cent, in net profits, despite a reduction in sales of almost 8 per cent, was shown in the company's annual report, for 1928.

Far-reaching effects of strict economies employed under a budgetary control system established in 1927 were reflected in the comparative results of that year and 1928, showing a decrease in sales during 1928 of $1,140,485.30 and an increase of net profits of $128,161.87. Net sales for 1928 totaled $12,199,044.74, with net profits for the year of $277,933.81.

There was no depletion in the cash working capital, a condition made possible by reduction of inventories of raw material and finished products, budgetary control and the addition of the profits of 1927 to the reserve as well as the sum of $233,721.53 depreciation which became available as cash for necessary expenditures.

The present ratio of current assets to current liabilities is a little over seven and one-half to one. No money was borrowed in 1928, all bills were discounted, and all interest obligations on bonds and serial notes were paid when due. The company's losses from bad accounts were one-twelfth of one per cent.

In 1929 the forward program inaugurated the previous year was carried forward intensively. A steel railroad bridge, 210 feet long was thrown across the second level canal from the Race Street spur track of the Boston & Maine Railroad to the Beebe & Holbrook-Wauregan group, 1,500 feet of track were laid to provide the necessary connections, and for the first time a direct railway freight connection was provided the Beebe & Holbrook, Massasoit and Wauregan plants.

The advertising, storage and distribution organizations were transferred the same year from their quarters in the Parsons Division to the second floor of the building formerly used as a general repair shop and adjacent to the Geo. C. Gill Division.

The Beebe & Holbrook-Wauregan Division was provided with a new power plant; connecting sections were built between two of these mills; the employment and payroll departments were provided with more modern quarters and facilities, and the upper floors of the Wauregan mill, formerly used for manufacturing, were remodeled and fitted for laboratory purposes.

The first floor of the laboratory contains the offices, library, general chemical laboratory, and humidity room. In the general chemical laboratory are facilities for the microscopical testing of fiber content, and connected with it is the general analytical room. In the rear is the humidity

room, where new humidifying and dehumidifying equipment was installed, which maintains a constant humidity load, so that papers can be tested under uniform and duplicate conditions at all times. The American Writing Paper Company is said to be one of the few paper mills in the country to install this expensive item of equipment, which includes an ammonia compressor for cooling and thermostatic control of temperature and humidity. Without dehumidifying arrangements it is impossible to operate this department in some summer periods.

In the same room are the tensile testers, used to determine the number of pounds' weight that can be hung on a strip of paper of given dimensions before breaking it, and also the folding testers, which are used to test the durability of paper by determining how many times it can be folded back and forth before breaking. The folding device swings automatically through an angle of 180 degrees, folding and reversing the fold by turns.

On the second floor are the inspection section where records and standard samples are kept, and the experimental machine room. A miniature machine, with 10-pound beaters as against 1,000-pound beaters used in a big production machine, are employed to test raw materials and determine how they will work in regular mill use. By this agency also, new fibers and sizes are tested. Adjacent is a room used for testing pulp, equipped with a water filtration plant for experiments to adduce results applicable to mill conditions, an important part inasmuch as the available water supply leaves much to be desired from the paper-making viewpoint. There is also a dark room, where photomicrographic work is carried on and where daylight lamps are available for accurate color-matching during twenty-four hours of the day.

A new instrument affords improved means of determining the finish of paper by measuring the light reflected on its surface, and a new electrical device amplifies the facilities for testing the strength of paper by ascertaining the number of pounds per square inch that a sheet will withstand. Other equipment is employed to test the fastness of colors and conduct experiments for the formulation of new colors. Pulp is tested for strength, color and dirt content, rags are tested for color, bleachability and shrinkage, and all materials, such as resin, alum, bleach, dyes and water are subjected to the required test in each case. Even the coal used at the plant as fuel is also tested.

Floors throughout the laboratory department are covered with an asphaltic compound that resists both acids and alkalis.

Extensive changes were made in 1929 at the Albion and Crocker divisions, the appearance of the former being completely changed, inside and out. New water wheels were installed, railroad sidings rearranged, wooden and corrugated iron buildings removed and sheet metal annexes torn out and replaced. The roofs and sidewalls of the machine room were rebuilt, stronger supports built for the machines, motor drives installed, and new stuff chests and motor driven knives were installed. The finishing building was enlarged and an area provided for stocks. The Crocker division was connected with the main power station, and new boilers were installed at the Riverside division. A new $40,000 gravity filter plant was added to the Parsons division and new beaters and beater room floors were installed at the Beebe & Holbrook, Mt. Tom and Nonotuck mills. A new design of beater was adopted that saves a large percentage of power, and the cutters were modernized, with the larger type equipped with auto-

matic counters that are said to have paid for their cost the first month of use.

The Nonotuck division manufactures all the book and offset papers; the Riverside division makes the machine-dried papeteries and Delta mimeograph; the Beebe & Holbrook-Wauregan units produce the loft-dried papeteries and ledgers; the Crocker mill manufactures cover papers, Index envelope and specialties; the Parsons unit makes loft-dried bonds; the Linden plant produces acceptance bond and blue print paper; the Albion division makes coatings and sulphite bonds; the Platner & Porter unit manufactures coupon bond; the Windsor division at Windsor Locks makes boards and jute papers, and the Mt. Tom division produces special machine-dried bond papers.

Other changes contributing to mill efficiency and earning capacity of the organization made in 1929 included the installation of a budget system based on breaking the sales dollar into its component parts, so that profits, bond interest, selling and administration, overhead, labor and material all have their proportions.

Standard payrolls for each mill and department and a policy of running departments of each mill in unison were inaugurated, and a retirement plan allowing for employees to be retired, on grounds of inefficiency and not of age, with various amounts of remuneration, for an indefinite period was adopted.

A wage incentive system, whereby employees work in groups on the task basis and receive a bonus on their wages, depending on the degree of effort put forth, was placed in full force in one mill and in partial force in a second and is said to be working to the mutual advantage of the company and employees, with the bonus in the first plant running more than 10 per cent of the wages in that factory.

Raw material quotas have been made the basis of raw material purchases, thus eliminating shortages of raw material and unnecessary trucking.

The American Writing Paper Company is capitalized for $15,500,000. Sidney L. Willson is president, R. D. W. Ewing, secretary, and L. S. Nold, treasurer.

THE PAPER MAKERS CHEMICAL COMPANY

In 1900 the Paper Makers Chemical Company was formed in Easton, Pa., to manufacture superior grades of rosin size, and other chemicals, for the paper industry, and in 1914, the trade demands were such in the New England territory that a plant was established in Holyoke. In 1928, when a consolidation of interests was brought about the Holyoke unit, with the plant of the Vera Chemical Company, at Stoneham, and that of John Regnier and Son Company, at Boston, were brought into the merger.

The Holyoke unit is capitalized for $325,000. W. J. Lawrence is president and secretary, C. H. Knight and R. M. Snell, vice presidents, and C. K. Williams, treasurer.

THREE WELL-KNOWN HOLYOKE ENTERPRISES

The Ely Lumber Company is one of the oldest concerns in Holyoke, having been founded by Watson Ely, as a contracting firm. It received the contract to erect the Holyoke city hall and other notable local buildings. The company is capitalized at $80,000, employs about seventy in the retail lumber business and general mill work and is agent for the Curtis woodwork.

Frank W. Ely is president, Everett H. Lynds, secretary, George S. Lewis, treasurer, and J. R. Lewis, assistant treasurer.

In 1903 the Bullard Thread Company was established, and was incorporated in 1919, with capital of $150,000. Spool cotton, and darning and knitting cotton are produced, and the company are also converters and finishers of cotton goods. Forty employees are carried on the rolls.

C. G. Watson is president and D. L. Kinley, treasurer, of the corporation.

In 1903, The Holyoke Valve & Hydrant Company was organized, with capital of $100,000, and during the intervening years has developed a large business in erecting high pressure steam piping, sprinkler equipment, heating and jobbing lines, and in mill supplies and steam specialties.

The officers are Frank H. Metcalf, president, George S. Lewis, vice president, and F. A. Smith, treasurer and general manager.

THE CROCKER-M'ELWAIN COMPANY AND THE CHEMICAL PAPER MANUFACTURING COMPANY

The contributions of three generations of the Crocker family to the paper industry of Massachusetts have been exceeded by those of no other single group, and the influence of Hon. Alvah Crocker and his descendants on the welfare of Fitchburg and that of Samuel Somerbie Crocker, and of those who succeeded him, on the development of Holyoke, stand out as epics.

The production of paper originally became a Crocker family industry when Deacon Samuel Crocker became interested in this activity, in Newburyport. In 1796 he transferred his operations to Leominster, where he became an employe in the first paper mill built in that locality. It was in the Nichols & Kendall plant there that his sons, Alvah and Samuel S., became interested in the art. The former removed to Fitchburg where he founded what is today the world-famous Crocker, Burbank Company. His brother, Samuel S., who had entered the Leominster plant at the tender age of ten years was employed in Alvah's primitive mill when but sixteen, where he remained for two years.

In 1839, he acquired the water-power rights at the Snow Mill, in Fitchburg, where he successfully carried on paper production for a number of years. In 1853 he sold the business, and removed to Lawrence, where he built and operated the first paper mill established there. Twelve years later, he returned to Leominster, where he built the Crocker Woolen Mill, in 1865, but the lure of the paper industry urged him on and in the late sixties he formed the Crocker Manufacturing Company, at Holyoke, with his son, Daniel P., the father becoming president, and the son, treasurer and clerk. The latter died in 1887, and he was succeeded as treasurer by his twenty-eight years old brother, Clifton Alvah Crocker, the youngest son of Samuel S., who lived to the ripe old age of ninety-six years. The business attained large proportions, and in May, 1890, R. Franklin McElwain became associated with Mr. Crocker, and soon afterward the company purchased what was then known as the Albion Mill, located adjacent to the original plant of the Crocker Manufacturing Company. Between 1892 and 1895 these two mills were consolidated by reconstruction and enlargement into a first class plant, which was acquired in 1899 by the American Writing Paper Company. Clifton A. Crocker was a director and member of the executive committee of the new combine until 1902, when he resigned, and, in 1904, with his brother-in-law, R. Franklin McElwain, he organized the Crocker-McElwain Company, becoming presi-

dent and treasurer, with Mr. McElwain, as vice president. The corporation purchased the so-called Cabot Street Mill, owned by the Holyoke Water Power Company, together with a valuable water power connected with it. The property was at once converted into an up-to-date writing paper mill, which went into production, in May, 1905, and the plant, with subsequent additions, constitutes what is now the Crocker-McElwain Company's Cabot Street Mill. The concern immediately became a leading factor in the paper industry of the city.

In 1929 the corporation installed additional electrical machinery in its Cabot Street plant, at the first level canal in order to replace its direct steam power with steam-electricity energy, this step being adopted to obtain greater economy of operation and also to enhance the production capacity of the mill. The installation included a generator of from 450 to 500 horse-power and six motors.

The company has capital of $1,750,000, and employs 300 operatives. Clifton A. Crocker is president, A. H. Hill, E. E. Tucker, and Joseph E. Holmes, are vice presidents, R. W. Ellis, secretary, and Joseph E. Holmes is treasurer.

In 1913, Messrs. Crocker and McElwain purchased from James H. Newton, and others, the plant of the Chemical Paper Company, which had previously been operated by Daniel H., John C., Moses, and James H. Newton.

Following the acquisition of this mill the corporation was reorganized under the name of the Chemical Paper Manufacturing Company. This plant, with its additions and improvements, and the subsequent addition to its property of the building on Main Street, formerly owned by the United States Envelope Company, constitutes the Chemical Paper Manufacturing Company of today. It is one of the largest paper mill plants, with one of the most valuable water powers, in the city of Holyoke.

In 1928-29 the Chemical Paper Manufacturing Company installed a new filtration plant, with a capacity of 5,000 gallons a minute, and of the gravity type, similar to that added by the associate concern, the Crocker-McElwain Paper Company, in 1925.

The object of the filter is to reduce the high color of the river water to meet the company's requirements, a need that is specially in evidence in the spring freshet season. The contract involved the erection of a building 50 by 70 feet in dimensions.

In May, 1929, the company began the erection of two plant additions, at an estimated cost of $500,000, one structure being a new cylinder mill and the other a new preparation plant.

The buildings are of steel and reinforced concrete, and it was expected the machinery would be in operation in both structures by January 1, 1930. Some old buildings formerly used for storage of raw materials, were torn down to make room for the new units.

With the machinery installed in the new cylinder mill the concern will expand its production of boxboard, in which field it is a recognized leader. A new cylinder paper machine will be added, and one of the present machines will be rebuilt and relocated. The equipment of the plant, prior to the addition, consisted of two cylinder and three Fourdrinier Machines.

The business of the Crocker-McElwain and Chemical Paper Manufacturing Company units for the first half of 1929, exceeded that of the comparable half of the previous year, by a wide margin, gains in some lines being as great as 30 per cent.

The latter concern has capital of $2,500,000 and employs 500 hands.

Clifton A. Crocker is president, A. H. Hill, E. C. Tucker and Joseph E. Holmes, vice presidents, Joseph E. Holmes, treasurer, and R. H. Morrill, manager and assistant treasurer.

The two corporations owned and controlled by the Crocker interests have a capacity of nearly 100 tons of paper per day. Their products include well known brands of bond, ledger, index, cover, manifold and other writing papers. Colored specialists and high grade folding box boards are also made at the Chemical Paper Manufacturing Company's plant.

THREE TWENTIETH-CENTURY CONCERNS

In 1908, the Perfect Safety Paper Company, which fourteen years before had begun the manufacture of safety paper for bank checks, coupon railroad tickets, and negotiable instruments in general, at Franklin, Ohio, removed to Holyoke, and since 1910 has been manufacturing safety papers of all kinds in its own plant.

The company is capitalized for $160,000, and its products enjoy a nation-wide distribution. J. B. Wies is president and treasurer, and E. E. Hazen, secretary, of the corporation.

The New York-New England Company, organized in 1909, capitalized for $147,900 and employing 100 operatives, was originally started as a bristol and papeterie manufactory, and later developed the manufacture of an extensive line of cover papers, photographic mounts, box covering papers and specialties of all kinds. It is recognized as one of the few concerns manufacturing these specialties for the jobber and the printer.

Founded by a group composed partly of Holyoke men and partly of New Yorkers, the unique name of New York-New England Company, was adopted. Henry and James Taylor were the Holyoke members, and the purpose of the enterprise was to manufacture attractively finished papers for the papeterie trade, then a strong factor in this section. In 1916 the concern was reorganized with John Adie, of Holyoke, as president and treasurer, and four years later the plant was enlarged and the manufacture of cardboard cover papers, fancy box covers and various paper and cardboard specialties, was begun. George A. Smith, who previously was connected with the Hampden Glazed Paper & Card Company, became associated with Mr. Adie and now holds the office of vice president in charge of sales, while Walter J. Price is vice president in charge of manufacturing.

For months this plant has been operating at full capacity and 1928 was reported as the best year that the company has had for some time. This concern is one of the very few manufacturers to make a feature of watermarks in material designed for greeting cards, photo mounts, and covers. While the line was brought out in 1927 it was not until late the following year that a real volume production was attained. The process familiar to users of bond and ledger papers has been applied in an elaborate way to dress up another class of papers. Designs are transferred to the paper by the use of a dandy roll made especially for that job, and many unusual effects are produced, including Scotch plaids and a variety of figured designs.

Growing sales are also reported for this company's line of gold and silver-coated papers, used for covers, greeting cards and picture mounts, another comparatively new line for this concern, and a variety of artistic finishes have been produced. One of the uses that contribute to the demand for such papers and cardboards is that of window displays. Here the gold and silver as well as the water-marked products find a place in the elabor-

ate effects worked out by paper converters and printers, either as store advertising or as a setting for exhibits.

The company maintains sales offices in New York, Boston and Chicago.

The Holyoke Company was established in 1910 and installed 150 braiding machines. In 1928 the concern, which had been engaged in manufacturing rubber and cloth-covered wire for electrical and other purposes, materially increased its plant equipment by the installation of eighty-seven braiders, for the production of radio harness, and forty-four additional braiders to enlarge its output of fixture and annunciator wire, and all the available space in its South Holyoke plant, formerly the property of the Century Machinery Company, is now occupied. With the additions to the plant acquired in 1926 the company has upwards of 33,000 square feet of manufacturing space.

Formerly the Holyoke Company produced millinery wire in large volume, but within recent years it has firmly established itself in the electrical field. In 1928 it acquired the De Luxe Sales & Manufacturing Company, of New York City and formed its own research and service organization.

One hundred hands were added that year, bringing the total to 175. The concern has capital of $215,000, and maintains a New York office, at 621 Broadway.

H. T. Smethurst is president, W. R. Marshall, vice president, and Robbert K. Morton, treasurer and secretary.

THE HOLYOKE HEATER COMPANY

The Holyoke Heater Company was originally started in the summer of 1910 as a department of the Barlow Company, manufacturers of store fixtures and two years later the concern was incorporated, with a capitalization of $5,000 since increased to $50,000. George C. Gill became president, and Peter S. Sinclair, vice president and manager.

The first kerosene water heater, with copper coils, was manufactured in 1912, for which a basic patent was issued, and the company has continued to make this type since that time. The "Holyoke" has been approved by the *Good Housekeeping* Institute, the New York *Herald-Tribune* Laboratory, the *Priscilla* Magazine, and the buying public all over the world. Heaters have been shipped to every country on earth. They are used in suburban and country homes for heating water for domestic purposes, as well as heating seashore houses, through radiators using the hot water system.

This company's line of gas water heaters has been approved by the American Gas Association Laboratories.

In 1920, the company bought the McHugh Foundry in order to make its own castings and in 1926 it commenced the manufacture of a line of auxiliary water heaters, to be used in connection with steam or vapor house heating boilers to produce hot water for domestic purposes.

When the company was founded, its officers decided that its products should be marketed under the name of Holyoke,—its home city. It was deemed that the name would always create among its workmen that incentive to manufacture the best product in its line. When an article is good enough to be named after its home city, it can be depended upon that it is the best that experience, science and engineering ability can produce.

In recognition of this fact, the jury of awards at the Sesquicentennial Exposition, in 1926, awarded the company the gold medal "for unique and exceptional features of design of kerosene and auxiliary water heaters."

George C. Gill is president, Peter S. Sinclair, vice president, John H. Conant, treasurer, Lincoln B. Smith, assistant treasurer, and H. E. Pihl, secretary, of the company.

SOME RECENTLY INCORPORATED CONCERNS

In 1917 Herman R. Dietz, who entered the baking business in Holyoke in 1883, and who had incorporated the Dietz Baking Company in 1912, organized the Massachusetts Baking Company, which, in 1925, was sold to the Continental Baking Company, of New York City. This concern now operates sixteen branches in New England, in which over 1,000 workers are employed, all the units carrying the name of Massachusetts Baking Company, Dietz Bakeries. The headquarters are in Boston.

The American Braiding Company was established in 1918, with capital of $50,000, and the plant is equipped today with 500 braiding machines, engaged in the manufacture of lacings, cords, electrical and cable wires, and braided specialties. The concern employs 100 operatives. B. Feinstein is president and M. Feinstein, is treasurer.

The Holyoke Wire Cloth Company was incorporated in 1919, and began the manufacture of Fourdrinier wire cloth for paper mills, with one loom, since increased to five.

The company has capital of $30,000. George Docherty, Sr., is president, and Edward Docherty, treasurer and secretary.

In 1920 the Holyoke Worsted Mills, Inc., succeeded the former Beebe, Webber Company, George H. Pearson becoming president, and James T. Tobin, treasurer. Men's and women's wear, including worsteds and novelties are manufactured, and seventy-five hands are employed. Frank F. Tobin is vice president and Herbert W. Cowan, secretary, of the corporation, which has capital of $200,000.

The same year the Holyoke Silk Hosiery Company was incorporated, and has capital today of $432,000, and now employs 175 operatives.

In 1928 the company materially increased its mechanical equipment in order to produce high-grade sheer silk hosiery for women's wear, and has thirty knitting machines, and auxiliary equipment in operation, in the four floors and basement of its factory.

E. P. Bagg is president, Alexander W. MacKenzie, secretary, and Melbourne B. Hunt, treasurer.

In 1926 the Lynch Knitting Company was established by Frank E., and John M. Lynch, and is engaged in producing light weight knitted cloth and rayon underwear.

The following year the Mount Tom Silk Company, Inc., was incorporated, and now employs seventy-five operatives in the manufacture of broad silks, crepes, satins, silk and rayon mixtures, and novelty goods.

The concern is a partnership and includes Walter and Joseph Hampson, Earnest Torbert and Richard J. Guenther.

THE REYNOLDS MANUFACTURING COMPANY

In 1927, the Reynolds Manufacturing Company founded in 1922, by Wellington G. Reynolds, and which purchased at that time the business of the M. J. Losti Sons Company and began operations in a room 50 by 100 feet, found it necessary, on account of increasing demands for its products, to secure larger quarters, and removed from the plant formerly used by the Essex Pad & Paper Company, which it occupied two years after it started, to the idle factory, at South Holyoke, built by the defunct New England Tire & Rubber Company—a three-story and basement

structure of brick and steel, which represented an original investment of $500,000,—and which affords the Reynolds concern 80,000 square feet of manufacturing space, in lieu of the 22,000 square feet in the Essex plant. In addition, it secured a railroad siding, a boiler house, and a fourteen-car garage, with opportunity to build another plant as large as the original building should expansion prove desirable.

In its first year the Reynolds Company's gross sales amounted to about $90,000, in the second year they increased to $140,000, in the third to $280,000, in 1926 they amounted to $375,000, and in 1927 they were over $500,000.

The principal line is the manufacture of tablets, pads, fillers and various other supplies for school use. Along with this is a general commercial line comprising many items for office use. The concern has its own printing plant, and this has been enlarged to meet the increased demands.

From 150 to 200 tons of paper a month ordinarily is manufactured by the concern. The company's paid-up capital and surplus combined amount to more than $100,000.

Charles D. Coe is president, and Wellington G. Reynolds, treasurer and manager.

FILLING UP FACTORIES FORMERLY IDLE

Like every other industrial community whose history is studied and analyzed, no matter where located, whether north, south, east or west, Holyoke has had its ups and downs, but considerably more of the former than of the latter, and there are those who see in her experiences of recent years a turning point in the industrial fortunes of the municipality. The pessimists chuckled when they heard of the collapse of the Century Manufacturing Company; they smiled sardonically when the failure of the New England Tire & Rubber Company was announced; they winked slyly when the Whitmore Manufacturing Company expired, and they said "I told you so," when the liquidation of the Lyman Mills took place. But they got little satisfaction when William Marshall purchased the Century Manufacturing Company plant and established the Holyoke Company in that structure, in order to take care of the expansion it required; they expressed surprise when the New England Tire Company plant passed into the hands of the Reynolds Manufacturing Company; they scowled when the Whiting Paper Company purchased the Lyman Mills, and arranged to install paper-making machinery; they looked askance when the municipal lighting department of the city of Holyoke bought the Hadley Mill and announced that the plant would be leased to new industries; they didn't enjoy, as did most of the citizens of Holyoke, the good news that the machinery of the Blake & Knowles pump branch of the Worthington Pump & Machinery Corporation would be removed from Cambridge to the "Paper City," nor did they welcome the purchase by The Marvellum Company, of the Whitmore Manufacturing Company plant, which was the last remaining idle factory in the city.

This purchase enabled the Marvellum unit to utilize approximately 100,000 square feet of additional floor space in the expansion of its business, and in this instance those who are observant note with a thrill of pleasure the twentieth century progress of this concern whose future seems to be unusually bright.

Those who occasionally peruse a volume issued by American publishers of the last century doubtless have observed the interesting marbled papers employed by bookbinders for centuries on the inside cover pages and prob-

ably have wondered why the more modern books fail to carry these as generally as of yore. With the demand for larger editions and the haste attendant in issuing books more expeditiously it has been impossible for the publishers and binders to use marbled papers because until recently they were made only by a slow hand process.

MASSACHUSETTS MEN REVIVE A WELL-NIGH LOST ART

Through the coöperation of artist and chemist, coupled with the backing of a skilled mechanical engineer who gave financial encouragement to the enterprise, The Marvellum Company has found it possible to revive a well-nigh lost art and to turn out truly wonderful designs in colors and bronze, far surpassing the old hand products in beauty, variety and utilitarian value, at a rate of production in keeping with modern quantity manufacturing operations.

Such specialties are being applied to a constantly increasing variety of uses, bookbinders, papeterie manufacturers, producers of greeting cards, novelty manufacturers, photographers, radio concerns, and others, being among the large consumers, and the almost phenomenal progress of The Marvellum Company serves as a conspicuous example of the development of a Massachusetts manufacturing unit, through the medium of the creation of specialty products which indicate the inventive genius and mechanical ingenuity that still constitute a live asset of many of our manufacturing centers, to become one of the leading enterprises of Holyoke.

In the brain of George Senseney, color etcher and designer, was conceived the idea of converting the ancient art of marbling paper into a practical mechanical plan, and applying it to up-to-date uses. He associated himself with Russell Bracewell, a Holyoke chemist, then engaged in research work for one of the large local paper concerns, and these two men, with Francis C. Heywood, who possessed the requisite mechanical ingenuity to work out the artistic and chemical factors in a practical way, approached the task of designing and building the machinery that would fulfill the purpose in view. After hard and patient work in the field of experimentation the combination of talents evolved a process which resulted in the production of something radically new in decorative paper effects and a field of unlimited possibilities was opened which has resulted in a successful and thriving business.

The marbling of the products varies widely, and the designs run the gamut from soft tones and figures so unassertive as to be almost unnoticed a little distance from the eye, to the brilliant and showy contrasts designed for certain purposes.

Because the figures produced by the art of marbling are natural formations secured by floating colors upon water, and then transferring these to paper, the results are as varied and dissimilar as the frostwork on a window pane or the foliage of the forest in the autumn seasons.

The general effect produced in former times by the English and Dutch craftsmen was comparatively plain to meet the demands of the time, but the rebirth of the art along modern lines has resulted in The Marvellum Company bringing out truly wonderful and gorgeous creations never conceived by the early exemplars of the art. Since we are living in an age when color values are all-important and are being sought for as never before, in all forms of decorations, the conditions surrounding the advent of The Marvellum Company seven years ago were eminently suited to the rapid development of such an enterprise as the Holyoke concern.

By the twentieth century methods employed by the company paper is fed into one end of a machine in a continuous roll, comes forth in a marbled state, is dried over steam-heated drums, and rerolled, embossed or cut into sheets as the demands of the trade require.

Not only has The Marvellum Company purchased the real estate formerly occupied by the Whitmore concern but it bought about $200,000 worth of machinery formerly employed in the paper converting industry, and which it has remodeled to meet the required expansion of the Marvellum unit.

William J. Warner, formerly manager of the cover and specialty department of the Hampden Glazed Paper and Card Company, joined the Marvellum organization as vice president and sales manager, in 1929, and the same year the company installed a large machine for printing paper for box covers and envelope linings. This device, weighing 23,000 pounds, has a capacity for printing twelve colors at one operation and connected with it is equipment for drying the paper, which hangs in festoons and is kept moving constantly down the room and back again, a distance of 500 feet, during which it is under the action of a hot-air blower system. As many as five reams are drying at one time by this process, from the single machine.

The concern also has installed a machine for the manufacture of cardboard by the pasting of paper in various thicknesses to produce heavy and light cardboard, as required, and to build up the photo mount stock of which the company is a large producer. With this pasting machine, supplemented with the necessary coating and finishing equipment, the company makes board not only for its requirements but for the use of other Holyoke mills.

Eighteen new lines of box cover papers were placed in production in 1929, by the Marvellum Company, as well as new lines for cover and announcement use. Among the latter is a line in seven colors embodying a wood-grain effect produced by the Marvellum process.

The sales of the company during the first quarter of 1929 marked a three-fold increase over the same period of the previous year.

George Senseney is president, William L. Warner and Paul L. Houston, vice presidents, R. S. Bracewell, secretary, and F. C. Heywood, treasurer, of the corporation, which has capital of $150,000.

In 1926, the Mabson Silk Company, a branch of a Paterson, N. J., concern, took over the former Goetz Silk Company mill, installed machinery, and began business with fifteen hands, since increased to 150, and has operated night shifts much of the time. It produces 25,000 yards of cloth and 2,000 yards of thrown silk weekly.

In 1928 the throwing plant, formerly located at Paterson, was removed to Holyoke and some eighty additional hands were added. The dyeing and finishing of the broad silks produced in Holyoke will be carried on in Paterson. The business is owned by M. Bornstein & Sons, of New York City, who also control the Middletown Silk Company, of Middletown, Conn., where half of the thrown silk manufactured at Holyoke is used. A plant was opened at St. Hyacinthe, Canada, on October 1, 1929.

THE MORART PAPER COMPANY, INC.

In 1927 the Morart Paper Company, Inc., was formed to engage in the manufacture of fancy box covers, envelope linings, and decorative papers, and has had a rapid growth. Much experimental work was carried on during the earlier months of the life of the concern, and many new ma-

chines were designed and built to meet the demands of the company. In 1929, additional new equipment was installed enabling the concern to double its production, and during many months of 1928 the plant was operated on a 24-hour a day schedule.

Maurice J. Moriarty, formerly manager of the Albion Paper Company, is president of this company, and Charles F. Moriarty is secretary and production manager. Charles H. Barr, formerly with the Crocker-McElwain and Chemical Paper Manufacturing Company, is treasurer in charge of sales promotion.

THE STUEBING-COWAN COMPANY

In 1927 another instance of the West coming East to serve New England was observed in Holyoke. Due to the large demand of progressive Massachusetts manufacturers, the Stuebing-Cowan Company moved the manufacture of the famous Stuebing steel bound platform to the Holyoke plant to take care of the demands not only of New England, but most of the East. This decision was made after a very careful survey of the potential market for this product and the very favorable outlook for the future.

A development that promises much for the Holyoke plant is seen in the recommendations recently made by manufacturers and railroad officials and approved by the United States Bureau of Standards, for the extensive use of standardized skid platforms for transporting freight from one concern to another in railroad cars, thus avoiding the cost and delay of rehandling. Skids so used may be returned empty to the starting point, they may be used interchangeably among various plants, or they may be discarded or retained for the customer's use, without any return to the shipper, in some cases, as they frequently cost less than the packing cases they displace, while resulting in much labor-saving.

This method of shipping freight was given very close study by the Mount Tom Sulphite Company of Holyoke, which was a pioneer in this departure and was equipped with some 4,000 skids. Within the last two years, the practice has shown a rapid increase through the process of coordinating the operations of manufacturers, railroads and motor trucks. The manufacture of these skids has been a big item with the Stuebing-Cowan plant in Holyoke. It is the judgment of specialists in material-handling that the use of such skids will be largely increased in the near future. They can be used advantageously in the moving of such staple products as paper, rubber, sheet metal automobile parts and other items that enter largely into current manufacturing operations.

Manufacture of a new electric-lift truck for use with platforms of six to eleven inches in height was commenced in the Holyoke plant in 1928. The same year the Stuebing-Cowan Company leased for a term of years a two-story building, containing 20,000 square feet, from the gas and electric department of the city of Holyoke, one of the main reasons for this acquisition being that the company found it could better serve the large and growing Pacific Coast trade at much less cost from Holyoke than from its Cincinnati plant.

In 1929 the manufacture of the Blue Streak light-duty hand-lift truck brought out by the company, in 1927, was transferred from Cincinnati to the Holyoke plant.

In addition to the Cincinnati and Holyoke factories, a Canadian plant is operated at Granby, Quebec, with offices in Montreal, and a European plant at Moosburg, Bavaria, which serves the entire European field.

In 1929 the corporation was acquired by the Yale & Towne Manufacturing Company, of Stamford, Conn., which concern for many years has manufactured a line of material-handling devices for factory use, including hoisting apparatus, trollies and trackage systems, and to these was added about ten years ago a line of electric industrial trucks. Henceforth its production will be of still broader range. Plant space occupied by Stuebing-Cowan in the property of the Holyoke gas and electric department has been extended within recent months and a new office has been fitted up for the concern in the main building of the municipal group, while space formerly used for office purposes in a rear building has been turned into manufacturing area.

The corporation has capital of $380,320, and maintains a Boston office at 950 Park Square Building, in charge of William E. Judge.

W. C. Stuebing is president, J. R. Harlan secretary and W. H. Mitchell, treasurer. Theodore T. Ludlum is manager of the Holyoke plant, where 175 hands are employed.

THE WORTHINGTON PUMP & MACHINERY CORPORATION

With the removal of the Blake & Knowles division of the Worthington Pump & Machinery Corporation from Cambridge to Holyoke, the enlarged Deane works are now producing a more extensive line of pumps than ever before. Those for naval and marine use previously manufactured in Cambridge are now made in Holyoke in addition to the lines previously produced for various purposes, ranging all the way from 100 pounds to thirty tons in weight.

Work was started early in 1928 on pumps for six United States scout cruisers under construction at Fore River, Philadelphia and Norfolk. As upward of one hundred pumps are required to outfit a large modern scout cruiser, this meant a substantial contribution to the activities of the Holyoke plant.

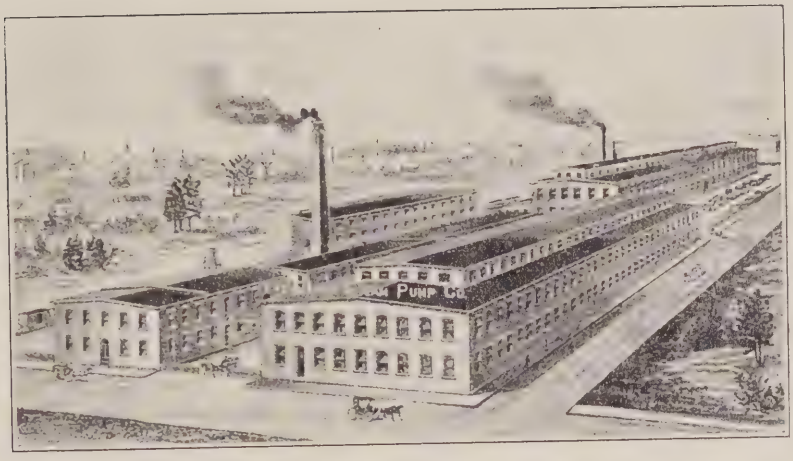
With the enlargements of the machine and erecting shops and pattern department, completed a few years ago, the Deane works are in a position to expand production as needed to keep up with orders. The machine shop is now 1,000 feet long and one of the biggest in the East. The capacity of the erecting shop has been increased in corresponding degree and the pattern department includes 50 per cent more space than previously. Approximately 10,000 tons of products yearly have been shipped from this plant, and still greater production is forecast.

The Holyoke unit is now employing more men than at any time in its history, save during the World War.

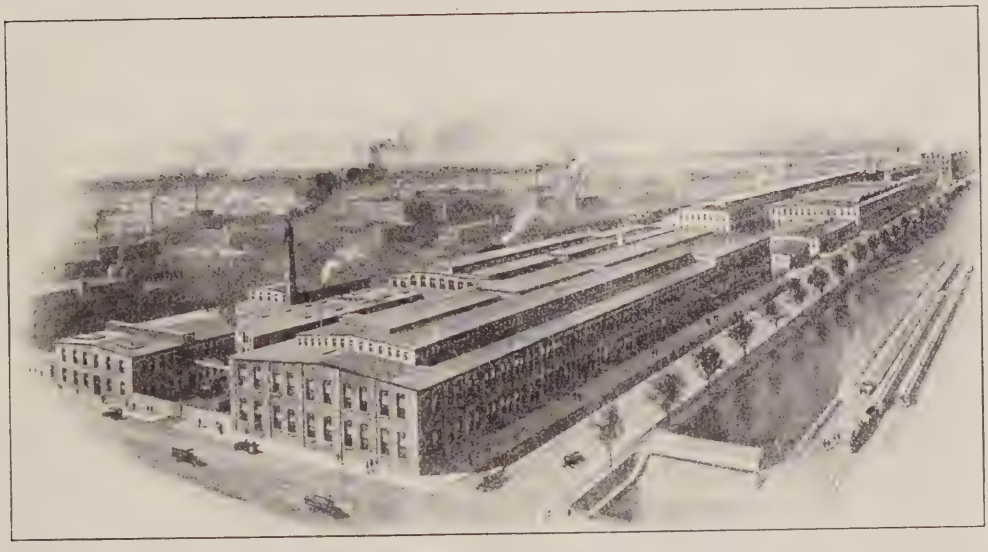
HOLYOKE GOES TO THE ASSISTANCE OF ARIZONA

It is difficult to see what possible connection there can be between Holyoke and that part of Arizona located below the famous Roosevelt dam, but in the development of that region that is being made phenomenally successful through the production of fruit and vegetables, by the process of irrigation, and in the transformation of desert lands into rich fertile soil capable of growing crops that mature in advance of those in California, the Holyoke plant of the Worthington unit is bearing a constructive part that transcends the bounds of expectation of the most enthusiastic exponent of irrigation activiies.

The production of deep-well pumps for irrigation in this southwestern field is going forward at an increased rate in the Deane works. Orders for between fifty and sixty of such devices were booked in 1929, in addition



THE DEANE STEAM PUMP COMPANY, HOLYOKE, 1890



THE PRESENT DEANE WORKS OF THE WORTHINGTON PUMP & MACHINERY CORPORATION, HOLYOKE

to some fifteen or more previously delivered. The cost averages from $3,500 to $4,000 each, and their production has come to constitute approximately one-tenth of the annual output of the Deane establishment.

While irrigation in Arizona dates back to an early time the construction of the great Roosevelt storage dam, under the direction of the United States reclamation service, opened a new and marvelous era. The first Deane customer operating in the territory below the dam was the Salt River Valley Water Users' association, a coöperative growers' organization, to which nine Worthington deep-well pumps were delivered and for which some thirty more are in construction or contemplated. Later the Roosevelt Water Conservation district was developed on similar lines. This organization first purchased six deep-well pumps and six more were supplied in 1929. In addition the Buckeye Irrigation district, financed in 1929, proposes to install many such pumps in another part of the same region.

Pumps for this work are set from 100 to 160 feet underground and perform the double purpose of drainage and irrigation. First attempts at irrigation in this area were unsuccessful. In the Salt River Valley, where hundreds of thousands of acres are now being irrigated, the soil formation and strata were such that the seepage from the river and from the irrigation ditches as they were cut accumulated a subsurface water table that gradually rose near the surface and brought with it mineral salts, or alkali. The answer to the problem was drainage. It was found that for purposes of agriculture the water table should be allowed to rise to a level not nearer than ten feet from the surface, at which distance all trouble from the alkaline condition disappeared. The end was attained by the use of deep-well pumps as the most practical measure to cope with the conditions.

THREE FORMS OF PUMPS DEVELOPED

Development along these lines was carried on under the direction of C. C. Cragin, an expert drainage engineer with World War experience. Three forms of deep-well pumps were developed by the Worthington Company, the "Axiflo," the "Coniflow" and the "Hiflo," the last-named being patented in 1929. The "Axiflo" is adapted to projects calling for the pumping of water in large volume and particularly suitable in the sandy regions of the Southwest, because it is less subject to sand interference than most other types. The "Coniflo" is preferred in locations requiring less capacity but calling for a greater pumping head. It is especially favored for wells subject to appreciable variations in water level. The "Hiflo" is designed to combine in a large degree the advantages of the other two types.

H. F. Benson, engineer at the Deane works, invented and developed this line of pumps for irrigation work and personally spent much time in Arizona studying the conditions of the Salt River Valley area.

AVOIDING THE WASTE OF WATER

At first the excess water pumped out of the valley areas was carried off in ditches and canals and ultimately turned into the rivers and thence discharged into the sea. But on investigation it was learned that when the water was pumped from a depth of more than 100 feet, instead of being permitted to rise and saturate the soil, it did not carry the alkaline content that was ruinous to agricultural operations. Following this discovery a new policy was instituted and instead of the water being

discarded it was employed as a special means of irrigating the lands, and the same water is now being used three times at as many levels at various distances below the Roosevelt dam. Storage reservoirs form an essential factor in the arrangements here as in the operation of the great dam itself.

Some time was required to determine the form of pump best adapted to the drainage and irrigation requirements. In 1922 three Worthington "Axiflo" pumps were installed, each with a capacity of 4,000 gallons a minute. In 1925, ten additional units were purchased for capacities ranging from 2,500 to 5,000 gallons a minute. Improvements in the form of artesian pumps as related to a given task in this connection have been made by the Deane works engineers in the intervening years, with resultant gains in efficiency. The success of the Salt River Valley Association has been such as to attract other organizations of smaller size into the field and the general system of operations is still in its infancy.

In addition to field studies by engineers sent directly from the Deane works, much engineering work was done in the Salt River Valley in the early years by the Deane representative at El Paso, Texas, and for some time past the company has maintained a representative at Phoenix, Ariz., continuously.

The same general type of pump used in these irrigation projects is employed by various industrial concerns, such as paper and textile manufacturers, ice cream manufacturers and others requiring a supply of pure water for their processes. The General Ice Cream Corporation has such pumps in operation in artesian wells in Springfield, New Haven and Burlington, Vt. The industrial demand for such pumps promises to continue at an increased rate.

In 1929 the Deane-Blake-Knowles Works began the delivery of fourteen Duplex hot-oil pumps to be used in the oil refineries of southern Russia, which area is undergoing extensive development by the Soviet government with the aid of British and American financial interests.

These pumps ranged in size from 12-inch to 24-inch stroke and from 24 to 48 inches in diameter and had an average value of approximately $7,000.

It is believed that this initial contract may be followed by other Russian orders for equipment of a similar nature.

To Italy were shipped during 1929 twenty-four Worthington deep-well pumps, in the line used extensively for irrigation purposes in this country and abroad.

The Deane-Blake-Knowles plant enjoyed a busy season in 1929, with the employment force at the highest point for several years, and indications are that this active condition will be maintained for some time to come.

THE WALSH HOLYOKE STEAM BOILER WORKS, INC.

In 1928 the first major application of the metallic arc system was made by one of Holyoke's long established industrial enterprises—The Walsh Steam Boiler Works, Inc., to whose plants engineers, technical experts and construction executives were attracted to observe the fabrication and welding of the 48 and 54-inch pipe line constructed to reinforce the water supply of the city of Springfield, for a distance of six and a quarter miles from Provin Mountain reservoir to the Connecticut River.

From as far distant as the city of Moscow came three representatives of the Russian government to secure information on the latest methods

employed in laying large-size pipe to meet such conditions as obtained in this instance.

Rolled steel, cut in 30-foot lengths is welded longitudinally by the metallic arc process. While this method has been used extensively for welding pipe of smaller diameters, the Springfield job provided the first application of this process, which differs from the carbon arc system, to an installation of such large proportions.

INTRODUCING AUTOMATIC WELDING

The welding was accomplished in the Walsh shops, and the automatic metallic arc welding machine employed for the purpose, made at Schenectady by the General Electric Company, is said to be the largest of its kind yet put in operation. Unlike the electric welding more familiar to the public, the equipment is operated by an automatic mechanical process rather than by the human hand.

In a practical way the process supercedes riveting and it is said to require only about half the time and produces a smoother and more satisfactory result, showing a virtually seamless surface when completed. After the 30-foot pipe sections were welded longitudinally they were sent by motor truck to the trench, where the girth joints were riveted by the use of compressed air.

Riveting of the pipe stands as a high mark in the achievements of The Walsh Holyoke Steam Boiler Works, Inc., along that line. With a smaller machine in use about two years in this plant the same process was used for pipe up to ten feet in diameter. Now, with the precedent that was set by the Springfield contract, it is expected that the welding of big pipe lines by this method will be in demand in various quarters and a new era in this department of electric welding will have been inaugurated.

In 1929 the Walsh concern delivered to the Montana Power Company of Great Falls, Mont., two turbine casings of spiral shape and also two draft tubes, all of riveted steel, for use as parts of vertical-shaft hydraulic turbines, each turbine having a capacity of 31,000 horse-power under an effective operating head of 83½ feet. When operated at maximum water will pass through the casing at the rate of 3,700 cubic feet or 27,700 gallons per second. The inlet diameter of the casing is 21 feet 3 inches, and the thickness of the metal is from three-eighths to five-eighths of an inch. The spiral tapers down to seven feet at the closed end.

Each casing weighed ninety-one tons and contained four and a half tons of rivets alone. Plates for these casings were joined longitudinally by three rows of rivets and circumferentially by two rows of rivets, the plates being lapped at these joints. Inside the spiral formation of the casing is a steel casting, attached to the casing and called the speedring, being twenty-two feet in diameter and weighing twenty-five tons.

The casings, built by the Holyoke firm for the I. P. Morris & De La Vergne Company, which held the main contract, are believed to be the third largest of their kind ever built in America, ranking next to those installed for the Philadelphia Electric Company on the Susquehanna, below Harpers Ferry, having inlet diameters of twenty-seven feet, and others installed in North Carolina, with inlet diameters of twenty-three feet.

Economically the riveted construction is said to mark a big gain, as otherwise the casing would have been of cast steel construction, necessitating greatly increased thickness of metal, enormously increased weight

and decidedly greater cost, not only of manufacture but of transporting and erecting.

The main product of the concern is the manufacture of steel fabricated boilers, and upwards of 100 men are constantly employed at the plant. W. J. Walsh is president, and C. D. Heywood, secretary and treasurer.

INVENTIVE GENIUS ALIVE IN HOLYOKE

That the spirit of inventive genius is not dead in Holyoke is apparent from the fact that James Mason Prentice, a 17-year-old graduate of the Holyoke High School, invented and patented in 1928 an automatic electric baseball game, which has been acclaimed by experts in this field as the only mechanical device yet perfected that is practical and easy of operation. After gruelling tests, it is said not a boy in school or college has been able to find a hitch to the sequence of the operation of the game, which enables two persons, by pressing electric buttons, to delineate in secret the full course of a baseball or football event, the plays being produced instantly through colored lights cleverly worked out by cross-switches.

SOME NEW HOLYOKE ENTERPRISES

The Jennings Silk Company, Inc., began production on August 1, 1928, of mixed fabrics of rayon and silk and rayon and cotton, when 100 looms, with the necessary winders and warpers, were started, and 100 operatives are employed in the plant formerly occupied by the Reynolds Manufacturing Company, which was taken over by the new concern. In 1929 additional processing machinery was installed and the production of drapery fabrics was added to rayon taffetas, slip satins and casket linings.

W. G. Reynolds of the Reynolds Manufacturing Company is president and J. J. Jennings, formerly superintendent of the weaving department and a designer for the Lyman Mills, is treasurer. Minot, Hooper & Co., of New York, are the selling agents.

In 1927 the Atlantic Cone Company removed its western Massachusetts plant from Springfield to Holyoke, where it is producing ice cream cones at the rate of 1,000,000 each twenty-four hours.

The company has about 44,000 square feet of floor space in use for manufacturing and production. Its custom is to keep approximately 100,000,000 cones in storage, in Holyoke, to meet its seasonal orders.

The McLaren Consolidated Cone Corporation of Dayton, Ohio, with which the Holyoke concern is affiliated has been acquired by the National Biscuit Company. Eighty-four plants and warehouses are embraced in the McLaren group. Outside this list are the Atlantic Cone Company and seven other New England plants not an integral part of the McLaren organization, though closely related to it through the makeup of their directorates and from being licensees to use McLaren machinery. The Holyoke plant makes deliveries of cones as far south as Florida and as far west as the Dakotas.

THE ZELOID PRODUCTS CORPORATION

In April, 1929, two units of the Riverside division of the American Writing Paper Company, Inc., known as Mills Nos. 1 and 3, were sold to the Zeloid Products Corporation by the Choral Properties, Inc., a company which was formed when the reorganization plans of the American Writing Paper Company were announced some time ago. The two mills were immediately cleared of all former machinery, and a contract was

awarded to the Bridgeport Engineering Company, of Bridgeport, Conn., for the production of the first units of equipment for the manufacture of transparent paper by the Zeloid Products Corporation at a cost of approximately $250,000. In addition the new enterprise expended about $50,000 in remodeling the buildings, which contain 270,000 square feet of manufacturing space, two railroad sidings, and sufficient area for the installation of fifteen units of machinery of the type used.

The Zeloid Products Corporation was formed under Delaware laws with $2,000,000 authorized capital. The controlling interest is held by Dr. Charles Hetzel, who is president of the concern. The treasurer is William J. Norton, also treasurer of the American Writing Paper Company, which corporation has an interest in the new company. Henry H. Peck is secretary in charge of sales, and Frederic T. Burkhardt is vice president.

Transparent paper is manufactured under the name of Zeloid by a chemical and mechanical process developed by Dr. Hetzel and controlled by American patents that have been assigned to the corporation. This process, which in the first stages is the same as employed for the manufacture of rayon, is said to be basically different from that used hitherto by another American concern for the manufacture of a similar product under French patents, and calls for equipment unlike that ordinarily used in a paper mill. The first unit installed has a capacity of 1,000 pounds of paper a day.

Zeloid is used extensively for the manufacture of sealed wrappers for candy, bakery products, dried fruits, nuts, perfumery, soap, tobacco, wearing apparel and many lines of merchandise. Being perfectly transparent, it meets the merchandising requirement of complete visibility for the contents of the package. The great and widening market for such wrappers is due to the modern method of buying goods in sealed containers instead of in bulk, a practice that has spread from one line of merchandise to another. Introduced in the United States on a large scale, it has been taken up in foreign countries to an increasing extent.

Dr. Charles Hetzel, inventor of the process and machinery for making Zeloid, was born in Swabia, Germany, the son of a paper manufacturer. Before coming to the United States he was engaged in the paper industry in Dundee, Scotland, for five years. During the last twenty years he has been engaged in the industry in this country. He and Mr. Peck, secretary of the corporation, were formerly of New York, but have taken up their residence in Holyoke. Samuel Deutsch, president of the Direct Wax Paper Company of New York and a converter and jobber of wax and glassine paper, is a director of the Zeloid Products Corporation, along with Doctor Hetzel, and Messrs. Norton and Peck.

Manufacture of the new paper starts with bleached sulphite pulp, like a great many other grades of paper, but departs from standard papermaking practice in the use of special machinery quite different from a regular paper machine. This method is said to possess distinct economic advantages.

Most of the transparent paper now produced is said to be of European make, and the new Holyoke development is expected to meet a large and growing demand. When in full production the Holyoke plant will have capacity to produce eight to ten tons daily.

Four United States patents on the process, awarded to Doctor Hetzel, have been assigned to the corporation. Not only is Zeloid transparent and clear as glass, but it is moisture and grease proof, made from pure wood pulp, it contains no animal matter, and will not decompose. The

Hetzel process is basically different from the only other process now in use and insures great tensile strength and uniform thickness of product.

HOLYOKE'S OTHER IMPORTANT INDUSTRIES

The Adams Stationery Company, with capital of $50,000, and of which LeRoy Adams is president and treasurer, J. A. Crawford, vice president, and W. P. Adams, secretary, is engaged in marketing stationery.

The Holyoke unit of the Baker-Vawter Company was absorbed a few years ago by Remington-Rand of New York City, in the merger which brought together many companies in various sections of the United States, but the local factory is operated with a full force of employees.

The Clark Manufacturing Company, with capital of $20,000, of which A. S. Clark is president and treasurer and W. J. Hall, secretary, is engaged in the manufacture of paper mill machinery.

The Cleary Manufacturing Company employs fifty operatives in the production of paper pads, tablets, and note books, James F. Cleary being president, John F. Shea, secretary, and James F. Cleary, Jr., treasurer. The corporation has capital of $25,000.

The headquarters and main office of the Collins Manufacturing Company, of which Samuel R. Whiting is president and treasurer, is located in Holyoke. The concern has capital of $300,000 and at the factory, in North Wilbraham and at the Holyoke office 350 employees are engaged in producing high-grade papers.

The Doane & Williams Company employ fifty operatives in the manufacture of store fixtures, G. W. Doane being president and treasurer and R. E. Doane, secretary.

For many years the E. H. Friedrich Company, with capital of $100,000, has been engaged in the production of architectural sheet metal work, Ernest H. Friedrich being president and treasurer, William Neumann, secretary, and Edmund H. Friedrich, assistant treasurer. The company employs 125 operatives.

The Haarman Steel Company employs eighty-five men in fabricating structural steel and ornamental iron, the concern having capital of $70,000. J. A. Schiebel is president and treasurer, F. W. Wagner, vice president, and H. L. Haarmann, secretary.

The Hampshire Brick Company, with yards in South Hadley and Chicopee, where 100 hands are employed in the production of brick, maintains its offices and sales headquarters at 24 Bond Street, Holyoke. Joseph F. Ranger is president, and James A. Ranger treasurer and secretary.

The Highland Manufacturing Company is one of Holyoke's leading concerns engaged in the production of stationery, employing 125 operatives, and having capital of $300,000. James O'Sullivan is president, Martin J. Judge, secretary, and Patrick J. Judge, treasurer.

The Holyoke Bar Company is engaged in the manufacture of paper mill engine bars, bed plates, and machine knives, and has capital of $50,000. Fred E. Maxfield is president, treasurer and clerk, A. M. Jorczak, vice president, and August Peterson, superintendent.

The Holyoke Brick Company has its sales and executive headquarters at 46 Park Street, and its factory in Chicopee. Fifty hands are employed in the production of building brick. P. J. Kennedy is president, William Mullen, vice president, and H. H. Parsons, treasurer.

Another of the numerous local paper mill machinery making concerns is Charles Koegel Sons, Inc., which is capitalized for $75,000 and employs thirty-five operatives. Frederick W. Koegel is president, Charles Koegel, vice president, and Wilhelmina Koegel, treasurer.

The Lynch Brothers Brick Company, capitalized for $84,000, maintains it sales headquarters at 206 High Street, and its factory in South Hadley Falls. Maurice Lynch is president, Joseph E. Lynch, secretary, and Patrick M. Lynch, treasurer.

The Macco Manufacturing Company, of which William P. McCorkindale is president, Russell Davenport, secretary, and Jesse E. Sheldon, treasurer, manufactures paper napkins, and has capital of $250,000.

One of the few New England units engaged in the manufacture of bleached sulphite pulp is the Mount Tom Sulphite Pulp Company, whose plant is located in the shadow of the mountain for which the concern is named. The corporation has capital of $300,000, Dudley P. Rogers is president, Harold O. Wellman, secretary, and George H. Clough, treasurer, the Boston office being located at 50 State Street. The concern employs 125 hands.

The Paper City Manufacturing Company is engaged in the production of paper specialties, including wedding announcements, calling and business cards, and cover and envelope linings, and employs forty operatives. The corporation has capital of $210,000, and Edwin P. Driscoll is president, and Thomas J. Kinnevan, treasurer and secretary.

The Casper Ranger Lumber Company is one of Holyoke's old established industries, having capital of $50,000 and employing 125 operatives in wood-working. William E. Ranger is president, James A. Ranger, vice-president, and Joseph T. Ranger, treasurer.

The Standard Corset Company, with capital of $50,000, employs 100 hands in the manufacture of corsets, Harold Chesson being president, H. Ray Chesson, secretary, and E. M. Houghton, treasurer.

The Taylor Logan Company Paper Makers, operate two plants in the production of writing and cover papers, employing upwards of 150 operatives, the second unit being carried on under the name of the Advertisers Paper Mills.

The corporation has capital of $230,000 and John Adie is president, Frank E. Taylor, vice president, and Charles H. Gardner, treasurer and secretary.

The Trotman Machine Wire Company, with capital of $60,000, manufactures wire cloth, W. K. Trotman being president, and A. D. Goddu, secretary and treasurer.

The Warner-Bryson Company, Inc., is capitalized for $50,000 and produces steel engraved stationery and Christmas cards, R. C. Warner being president, E. J. Collier, secretary, and William J. C. Bryson, treasurer.

Whiting & Cook, Inc., of which S. R. Whiting is president, and S. W. Cook, treasurer, employ 150 hands in producing high-grade stationery, the concern being capitalized for $75,000.

The Eastern Dairies, Inc., of Springfield, operates a Holyoke plant in the production of ice cream; the Springfield Provision Company, of Chicopee, have a branch unit in Holyoke; and John P. Squire & Company, of Cambridge, handle pork products at their Holyoke plant.

In 1929, the Unity Press, Inc., erected a two-story brick plant, 100 by 65 feet, where it publishes the *Export Trade* and *Finance*, and the *Nautilus* magazines. L. McL. Murray is president, and Charles T. Fahey, treasurer.

Invested in the 149 manufacturing establishments of Holyoke, in 1927, was capital aggregating $94,465,182. Utilizing stock and materials costing $41,194,149 the value of all products manufactured in the city that year was $83,558,047. To 16,186 workers were paid in wages in 1927 the sum of $18,302,713.

CHAPTER XXVIII

CHICOPEE

WHOSE "TIME TO RETIRE" IS KNOWN THROUGHOUT THE WORLD

The excellent water power so easily available at the falls of the Chicopee River early attracted the attention of manufacturers and gave to the locality the name of "Chicopee Factory Village," by which it has long been known.

Iron manufacture was the first industry to locate there and as early as 1786 ore was being taken from a vein a short distance above the dam which was afterwards built, and James Byers and William Smith constructed a blast furnace on the site. In 1801, it passed into the hands of Benjamin Belcher, of Easton, and Abijah and William Witherill, who added a foundry, Mr. Belcher continuing the business until 1822, when he sold the land and water privileges, upon which the extensive manufacturing interests of Chicopee Falls now stand. The iron business was conducted by his sons until 1846, when the manufacture of agricultural implements was begun at the plant, and continued until June 1, 1899.

In 1806 the water privilege on the north bank of the Chicopee River was sold by Oliver Chapin, the first settler, to William Bowman, and Benjamin and Lemuel Cox, who erected a paper mill, where production by hand was carried on for about sixteen years, when they transferred the business to Chauncey Brewer and Joshua Frost, who continued operations for five or six years thereafter. The mill then passed into the hands of David Ames, who invented and installed his paper-making machinery, and who, in 1825, was the largest paper manufacturer in the United States. His sons, David and John Ames, conducted the business until 1853, when the Lennox Chicopee Manufacturing Company became the owners of the plant.

CHICOPEE MANUFACTURING CORPORATION MORE THAN 100 YEARS OLD

In 1823 J. and E. Dwight, of Springfield, bought real estate in Chicopee and incorporated the Boston & Springfield Manufacturing Company, with capital of $500,000. A dam, canal and cotton mill were completed in 1825, and a bleachery erected later. In 1828 the name was changed to Chicopee Manufacturing Corporation and the production of cotton flannels and sheetings was undertaken, which has continued for over a century, the concern having had an honorable career under successive managements. Today it is capitalized for $1,000,000 and employs 1,000 operatives.

Beginning about 1850 Whittemore, Squier & Company operated a plant for the manufacture of patent Premium Stony Land, and improved Premium Eagle plows, side-roll hay cutters, Hampden corn-shellers, cultivators, and separators and cast iron road scrapers. The plant was situated on the Connecticut River at Chicopee Falls, and consisted of seven buildings, with a foundry attached, in which castings for their implements were made out of Berkshire iron, which was celebrated for its hardness. The beams were made of Massachusetts white oak, and the

handles were turned and bent by Blanchard's patent process. The concern was reputed to possess probably a greater variety of lavor-saving machinery than any other similar establishment at the time in the United States, one of the machines performing twenty-six different and distinct processes. It employed about thirty men in the manufacture of its products.

The Belcher & Taylor Agricultural Tool Company was really formed in 1852 when it occupied a plant on the south side of the Chicopee River, reestablishing itself on the north side during the '60s, and being incorporated in November, 1864, with $50,000 capital.

The J. Stevens Arms & Tool Company was incorporated in 1886, with $40,000 capital to continue the business established in 1864 by J. Stevens & Company. It is still in existence under the corporate name of J. Stevens Arms Company with $650,000 capital, employing 600 in the production of sporting fire arms. W. L. Wright is president, F. R. Phillips and F. F. Hickey, vice presidents, E. A. MacDonald, treasurer, and G. N. Dickinson, works manager.

THE LAMB KNITTING MACHINE INVENTED BY A CLERGYMAN

The Lamb Knitting Machine Company was incorporated in 1867, with $100,000 capital, and was re-incorporated in 1893 under the name of Lamb Manufacturing Company with $500,000 capital, and again in 1900, with $40,000 capital, since increased to $120,000, the concern still being one of Chicopee's leading industries, and employing 250 operatives.

Infrequent it is that an industry traces its beginnings to one whose profession it is to act as the spiritual leader of his fellowmen, but in this instance the Lamb Knitting Machine was evolved out of the clerical brain of Isaac W. Lamb, a Baptist minister presiding over a church in Michigan. He was the first to design a machine that would weave a tubular web in such a manner as to narrow or widen the product and thus manufactured what then was technically described, even as it is today in this era of flappers, as "fashioned hosiery," with both plain and fancy ribbed webs. The original Lamb machine was but twenty-six inches long and nine inches wide and it had the ability to knit not only all kinds of hosiery, but gloves, mittens, scarfs, hoods, jackets, cardigans, shawls, "clouds" and "nubias," as well. F. D. Howard is president, M. E. Sampson, secretary, and Nelson D. Carter, treasurer.

In 1882 the Overman Wheel Company came into being, with $250,000 capital, and production of the Victor bicycles continued for fifteen years, the concern going out of business in 1897.

CHICOPEE'S THIRD LARGEST INDUSTRY

At Chicopee Center manufacturing began about 1810 when carding machines and spinning frames were produced. The Dwight Manufacturing Company, the direct successor of the first factory established at Cabotville, known as the Cabot Manufacturing Company, which was organized in 1832, was incorporated February 6, 1841, with $500,000 capital. Three years later this was increased to $700,000. In 1856, the Perkins Mill, which, two years before, had consolidated with the Cabot Manufacturing Company, was taken over, and the capital of the Dwight concern was then fixed at $1,700,000.

The concern also operates a plant at Alabama City, Ala., and in 1929 a deal was consummated whereby the assets and the plant of the Great Falls Manufacturing Company, of Somersworth, N. H., was purchased by the Dwight Manufacturing Company, for $1,825,000. The Chicopee con-

cern resold the water power at Somersworth to the New England Public Service Company, and improved the Somersworth plant by installing new equipment.

It is the third largest manufacturing unit in the city, and today employs 1,300 hands, and utilizes capital of $5,000,000.

During the past few years the Dwight Manufacturing Company has made marked strides, plant modernization having been vigorously prosecuted, and efficiency increased all along the line. Where machinery could be improved for more profitable operation it was done regardless of cost, and much equipment was scrapped in the process. The concern benefited from the coöperation of the municipal government of the city, the plant valuation being cut between 20 and 25 per cent, or something like a million dollars. The Dwight management recognized the change in the standards of living by selling its corporation tenements as has been done by many other progressive concerns and during the year ending May 31, 1927, the concern produced 55,600,000 yards of goods, which required 57,000 bales of raw cotton.

The present equipment of the Chicopee plant consists of 120,000 ring spindles, and 2,500 looms.

Arthur Lyman is president, George Nichola, treasurer, James Thomson, assistant treasurer and clerk.

Approximately 100 years ago (1831) all the cotton mills in Chicopee had but 20,000 spindles and they produced only 13,500 yards of cloth daily.

NOT ALL OUR SWORDS ARE BEATEN INTO PLOWSHARES

The year 1928 marked the centennial anniversary of the manufacture of swords in Chicopee, as it was in 1828 that Nathan Peabody Ames, who began the production of edge tools in Chelmsford, as early as 1791, removed the business to Chicopee, and commenced the production of swords for the United States Government. At the outset the work was carried on there in a forge shop which Ames, with his two sons, N. P. and J. T. Ames, rented, and which was located on the north side of the canal at Chicopee Falls, but in 1834, the business was removed to its present location in Chicopee, and in 1849 the production had grown to such an extent that the original capitalization of $30,000 was increased to $250,000, a sum which gave the concern an important rank among Hampden County industries of that period. A brass foundry was added in 1836, and an iron foundry in 1845.

The history of this company is but another illustration of New England ingenuity, taking advantage of the changing demands of the American consumer. While cutlery, lathes, draw shaves, hatchets, chisels, bronze statuary, and doors, water-wheels, horizontal turbine wheels, planing machines, cotton machinery, bronze cannon, projectiles, gun making machinery, gilt and plated ware, and copper and bronze castings have constituted some of the products turned out by the concern during its century of existence, since the days of the Mexican War the Ames Sword Company has made the manufacture of swords its important activity, and the production of magnificent presentation swords for army and naval officers and leaders of fraternal organizations its specialty, in addition to providing bayonets, sabres, and swords for regular army and naval use. Within recent years the manufacture of fine swords for theatrical productions has grown to be an important item.

In 1831 Ames secured a contract to furnish swords to the United States Government, and during the Civil War large quantities of sabres,

swords, and bronze guns were turned out for the Union cause. In 1854 the British Government commissioned the Ames concern to build machines for making the stock, or woodwork of muskets, and this machinery was installed in the Enfield armory, near Woolwich, England.

In 1849 the concern began the manufacture of the Boyden turbine wheel, which had been invented and patented by Uriah A. Boyden, of Boston, two years before. In 1859, the right to manufacture the Boyden turbine, the earliest of American wheels of that type, was conveyed to the Ames Company, and a large number, varying from 100 to 500 horse power, were installed in New England and New York state plants.

Many of the swords produced by this Massachusetts concern have been presented to Civil War heroes, one with a grip composed of alternate panels of tortoise shell and gold, with emblematic heads in the center; the pommel of gold, enriched with diamonds, and the guard formed of miniature implements of war, being presented to Gen. Ulysses S. Grant. The Ames concern supplied the French army with 100,000 sabres in the Franco-Prussian war and the Turkish forces with 236,000 sabres during the Russo-Turkish War.

It has been the claim of the Ames experts that they could turn out blades equal in every respect to the celebrated products of Damascus and Toledo, while on the artistic side the early reputation of the concern has been fully maintained. One of the most recent creations was the sword produced for the city of Philadelphia and presented to Commander Byrd, following his flight over the North Pole, a wonderful design in which diamonds and rubies predominated in the decorative scheme. Another unusual production was the sword ordered of the Chicopee concern by the State of Florida for Major General Summerall, the guard and mountings of the scabbard being of solid gold, while diamonds and rubies ornamented the product. The Ames plant also provided the magnificent sword presented to Queen Marie, of Roumania, in 1926, by the One Hundred and Sixth Infantry of New York.

The revival of spectacular productions of a romantic and military nature on the stage and screen has added materially to the production at Chicopee, one order being filled in 1928 for 500 swords for a New York costuming house, while 100 elaborate swords were made for Ziegfeld's "Three Musketeers."

The colossal statues of DeWitt Clinton, in Greenwood Cemetery, Brooklyn, N. Y., of Benjamin Franklin, in Boston, and the equestrian statue of George Washington, in New York City, are products of the Ames Company, which, in 1881, became the Ames Sword Company, with $150,000 capital, since increased to $250,000.

Manufacturing society and military goods, the concern employs 150 operatives. Thomas H. Boeshaar is president and general manager, F. C. Strawn, vice president, and Bernard P. Roberts, treasurer and secretary.

In 1840 the Olmsted & Tuttle Company came into being and in 1880 the concern was incorporated with $100,000 capital.

In 1888 Albert E. Taylor and Walter Bramley began the manufacture of men's underwear under the firm name of Taylor & Bramley, adding children's and women's underwear two years later. In 1893 the concern was incorporated as The Taylor-Bramley Company, and from then until 1920 various lines of underwear and athletic and bathing suits were produced. In the latter year all lines were discontinued except infants' suits.

Capitalized for $100,000, the concern employs upwards of 200 opera-

tives. Fred C. Rickert is president and manager and Albert E. Taylor, treasurer and secretary.

In 1893 the Burtworth Carpet Company was incorporated with capital of $20,000 to manufacture brussels and woolen carpets and rugs. O. W. Temple is president and George W. Kimball secretary and treasurer of the concern.

In 1888 the Chicopee Falls Wheel Company was formed, with $12,000 capital, and the same year the Coburn Trolley Track Manufacturing Company was incorporated with $150,000 capital, but it removed to the Willimansett district of Holyoke in 1900, where it successfully carries on production today.

THE FISK RUBBER COMPANY

In 1898 Chicopee furnished a conspicuous example of the business acumen displayed by Massachusetts manufacturers in so adjusting production as to conform with the changing demands of trade. That year, at a period when the automobile was in its experimental stage, the Fisk Rubber Company was organized by Noyes M. and Harry G. Fisk, and began business in a single building containing 45,000 square feet of floor space, in which bicycle tires had been produced by the Spaulding & Pepper Company.

In the intervening quarter of a century the concern has become the greatest producer of pneumatic and solid automobile tires and tubes in New England, and today operates four production plants at Chicopee Falls and New Bedford in this state; Jewett City, Conn., and Pawtucket, R. I., and one in the west, located at Cudahy, Wis., while it maintains 148 sales branches throughout the United States, and in London, England, and affords employment to more than 8,000 workers in its factories, and to 750 in its sales organizations.

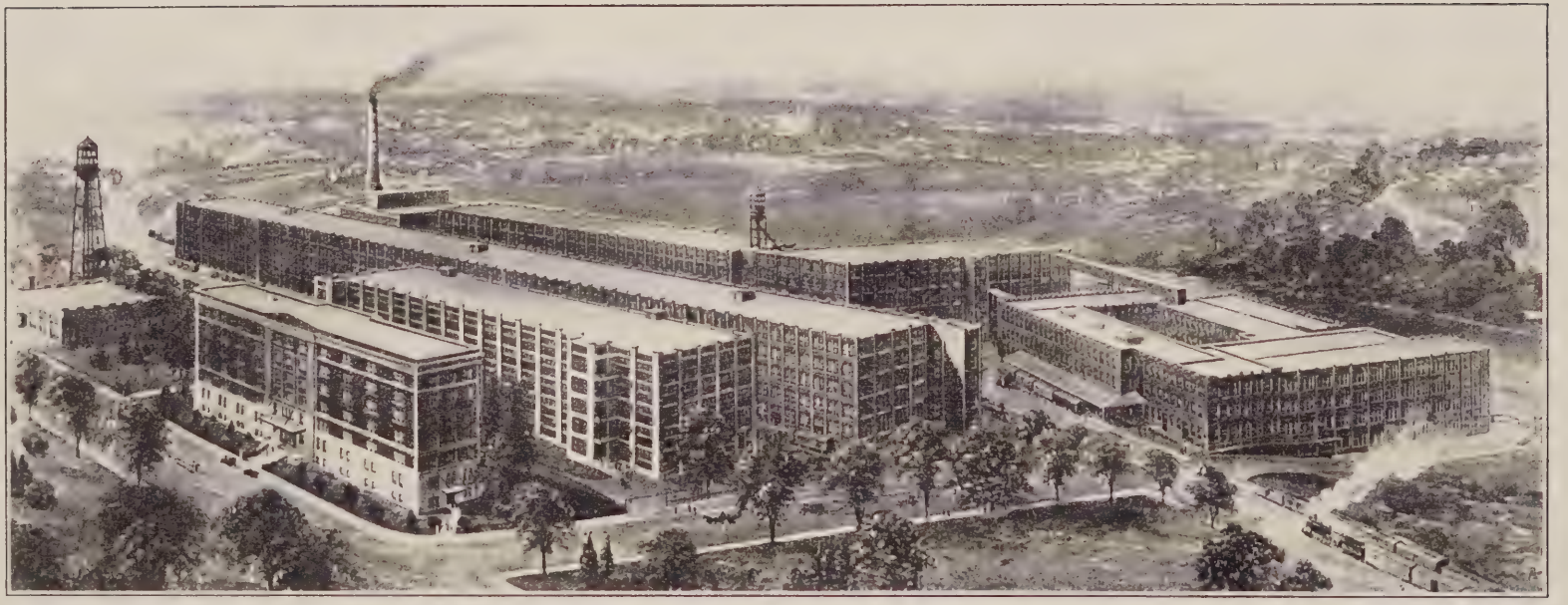
It seems somewhat significant if New England is not fertile ground for manufacturing developments that there should be located at Chicopee Falls the largest unit of the corporation, where the daily capacity production of the 4,000 employees, who are housed in thirty-one buildings having a total floor space of forty acres, and covering ground area of twenty-one acres, is 20,000 casings, 30,000 tubes and 500 solid tires.

The largest structure at the Chicopee plant is 700 feet long by over 100 feet wide, and five stories in height. In 1928, material additions were made to the local plant, a brick and steel structure where the compounding of chemicals is carried on, being built, containing 12,000 square feet.

The New Bedford, Jewett City, and Pawtucket, R. I., factories manufacture the textile fabric used in the tire production, while the Wisconsin unit has a daily capacity production of 15,000 tires and the same number of tubes, in addition to bicycle tires and sundries, and affords employment to 2,000 workers.

The gross sales of the company for the fiscal year which ended October 1, 1925, were $75,000,000, an increase of 41 per cent compared with the sales figures of 1924—a total which can hardly be said to reflect industrial decadence. With total assets of $54,460,312.20, including a surplus of $13,431,980.23, this Massachusetts corporation has attained its greatest growth and expansion during the past fifteen years.

The Fisk office building at Broadway, Fifty-seventh Street and Eighth Avenue, New York City, is a commanding structure of twenty-six stories, comprising approximately 470,000 square feet of floor space, while in all the company's plants 3,400,000 square feet of manufacturing space are



FISK RUBBER COMPANY, CHICOPEE FALLS

utilized. International distribution of Fisk tires is attained through the medium of warehouses and 150 branch offices.

The Fisk Rubber Company is the parent organization of the Fisk Tire Company, Inc., and the Federal Rubber Company, with a large tire factory in Cudahy, Wis., while in addition to the Chicopee Falls and Wisconsin units the Fisk Rubber Company is also the parent unit of three cotton mills in New Bedford, Pawtucket, R. I., and Jewett City, Conn.

The Fisk Rubber Company has capital of $30,000,000. H. T. Dunn is president, Harry G. Fisk, clerk, and R. B. McGaw, treasurer.

The combined production of the Chicopee Falls and Cudahy, Wis., units in 1928 exceeeded 6,500,000 tires as compared to 6,000,000 in 1927, while the number of employees was increased from 2,600 in the latter year to 3,000 in 1928. The company secured a number of original equipment contracts from leading motor car manufacturers in 1929, and arranged its production plans for a 60 per cent increase over the figures of the previous years on tires sold for replacement through its nation-wide retail dealer organizations. To handle this large volume of business, the company expended $2,000,000 in 1928 in improvements in plant and equipment.

The schedules of the automobile manufacturers which it supplies, together with dealer prospects, called for the production of 40,000 tires per day, or a total of 9,000,000 for the year of 1929.

In addition to its exclusive contracts with Willys-Overland and with Durant and a big order from Ford, Fisk Rubber closed a term contract in 1928, with the Chrysler Corporation on an advantageous basis, whereby its tires are to be exclusive equipment on all Chrysler, DeSoto and Dodge cars and trucks and Fargo trucks sold in the United States.

In the next several years Fisk will be able to keep pace with the natural growth in the industry and reach 60,000 tires daily capacity.

In 1929 a two-story addition was built at the Chicopee Falls plant, connecting Mills Nos. 27 and 28, and in this structure the chemical department is now located. The entire basement floor of Mill No. 27 is now used as a new tread mill room of the most modern type, and new machinery was installed at heavy expense which facilitates the processing of high quality stock for the manufacture of tougher tire treads. The installation included a conveyor system, which eliminates the handling of stock from the time it is mixed until the treads are formed, and a plasticator, the first of its type in operation in the United States, capable of processing from 40,000 to 50,000 pounds of crude rubber daily. It at once released four 84-inch mixing mills and reduced the cost of operation, and at the same time required but 30 per cent of the capital investment entailed by the method formerly used.

THE KNIT GOODS SPECIALTY COMPANY

The Knit Goods Specialty Company, established in 1899, is engaged in the manufacture of knit specialties and narrow woven goods, the products including knit tubular coverings which are widely used to afford protection in shipment for golf clubs, tennis racquets, canes, billiard cues, etc.; stockinette for lining of plaster casts; gas mantle fabrics; stockinette for covering ink rolls in the die stamping industry; spinning tape; and narrow woven fabrics. The company has made a specialty of developing tubular coverings for all purposes and has been very successful in the development of special articles for various trades.

In 1929 the company rushed production in knit bags to enclose shoes,

slippers or rubbers, these commodities having met with a good demand from department stores, women's furnishing stores and clothing concerns.

These additions to the company's line furnish examples of the enterprise Massachusetts textile manufacturers exhibit in these times in seeking out some promising specialty and conducting a drive in its behalf. In this case the articles are sold under the name of "Tecs" and are designed with an eye to beauty as well as utility. The Knit Goods Specialty Company also produces articles for industrial use. Frank C. Flint is the owner of the concern.

THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

An especially significant event in the industrial history of Chicopee Falls and in the annals of Massachusetts manufactures was the purchase, in 1915, by the New England Westinghouse Company, of what then remained of buildings used during the period of the Civil War for the manufacture of guns. The corporation known as the New England Westinghouse Company was formed to produce rifles for the Russian Government, and the plant was bought from the Stevens-Duryea Automobile Company, and, together with the East Springfield Works and several other allied properties, was converted to the production of rifles.

Following the collapse of the Russian Government, and at about the time when the United States entered the World War, the Chicopee Falls plant was rearranged and reequipped to manufacture Browning guns, as was also the East Springfield property. The two plants, under the management of F. N. Merrick, now vice president and general manager of the Westinghouse Electric & Manufacturing Company, successfully produced the Browning type of ordnance until after the armistice. Following the close of the World War, the machinery and equipment were turned over to the United States Government, and the buildings remained idle until the month of September, 1927.

Owing to the rapid expansion of the radio transmitting business, the space at the East Springfield Works, where the Westinghouse Electric & Manufacturing Company were producing medium sized units, and the area at East Pittsburgh, where the large units were constructed, was found inadequate, and the management considered it more economical to use this idle plant for transmitter manufacture than to construct additional buildings at the other factories. The location of the Chicopee Falls plant was considered ideal from a shipping standpoint, being within one day's trucking distance of the ports of New York and Boston.

Thus the latest manufacturing unit to join the great Westinghouse group may paradoxically be said to be the oldest, since a part of the buildings which have but recently been demolished in Chicopee Falls was used as long ago as the '60s.

The old structures that remain, plus some recently purchased realty, form the Chicopee Falls Works of the corporation.

One of the principal reasons why the Westinghouse concern did not avail itself of the idle plant at an earlier date than it did was because originally there was no railroad siding to the property. Attempts to secure the consent of adjoining property owners to grant rights of way required many months of negotiations, and in 1928, when some of the Pittsburgh departments were removed to Chicopee, the spotlight was thrown on the city as being the habitat of the world's first electrically-welded steel turn bridge, built for the use of a New England railroad in

serving the requirements of a New England plant and fabricated and erected by a New England concern.

This structure, 175 feet long, which spans a canal at Chicopee Falls, enabling Boston & Maine trains to gain direct access to the Westinghouse Company's river plant, stands as the forerunner of many railroad and highway bridges since built in various parts of the United States, employing the new process of electric welding in place of the customary method of riveting.

Electric arc welding as applied to bridges follows the general principles recently applied to the construction of steel buildings. It constitutes the final step that is expected to lead to the complete replacement of riveting with the welding process as a revolutionary feature of the steel industry. The building of the first electrically welded bridge was watched with great interest because bridge-building is regarded as the most critical field to which the process has been applied—a departure from the static to the dynamic—due to the vibration and stress to which a bridge, and more particularly a railroad bridge, is continually subjected.

Original plans for the Chicopee Falls bridge called for a structure of 120 tons weight. It was redesigned as an 80-ton bridge with arc-welded members. The savings of material thus effected is evidenced in the slenderness of the structure, which is laid diagonally across the canal, with a slight skew at the end nearest the Westinghouse plant.

On the four acres at the Chicopee Falls factory are located two six-story brick buildings, one four-story steel and brick building, one five-story office building, several one and two-story buildings, a boiler house, a transformer house, and some store houses, etc., comprising in all 166,000 square feet of manufacturing floor space, and 18,373 square feet of office space.

Of this area, 62,000 square feet are being used at the present for laboratories, and for the manufacture of radio transmitters and wired wireless, while the entire office space, with the exception of one floor, is being used to house the sales, engineering, drafting and factory supervisory forces.

Located in the midst of a good labor market, with an abundance of skilled help, such as toolmakers, it was predicted that a high grade of workmanship, worthy of the name of Westinghouse, would be secured. While the plant has been in operation approximately one and one-half years, the results to date fully justify this prediction.

Not only are radio transmitters of capacities varying from 500 watts upward for all kinds of service being built at this plant, but receiving sets such as are used by the U. S. Army and Navy and foreign governments, and wired wireless sets, such as are employed by large power companies are made here, as well. Special radio sets, such as combined sending and receiving types for aeroplanes and auditorium amplifiers form a part of its output.

In creating an organization for the operation of the plant, the policy of providing a complete independent unit was carried out to an unusual degree. While the works manager of the East Springfield Plant has jurisdiction over the manufacturing operations, yet the Chicopee superintendent, J. A. Lavalee, is practically independent, and controls all of the operating departments such as production, stores, rate, maintenance, shipping, employment, etc. Only the police and inspection departments report to the supervisory heads at the East Springfield Works.

The Engineering Department, under the supervision of A. K. Phillippi,

carries on development work in a well-equipped laboratory on the premises and also prepares the drawings, specifications and other information for the manufacture of the product.

Here again is specific evidence of the industrial progress of Massachusetts.

Surely the principal executives of so large and internationally known an enterprise as is the Westinghouse Electric & Manufacturing Company would not have deliberately chosen the Bay State as the location for two of its important units had they not been convinced that the required capital outlay was entirely justified.

Millions have been expended within the past two years at Chicopee Falls and East Springfield by the Pittsburgh concern, and the results have attested the wisdom of erecting and maintaining these two important companies in the Westinghouse production plan.

THE A. G. SPALDING & BROS. CHICOPEE UNIT

In 1928 A. G. Spalding & Bros. Company began the occupancy of its new office building, erected at the Chicopee plant, and no small proportion of the additional space is to be devoted to an enlarged laboratory, the officers of the concern being wedded to the policy of research and experimental work. It is at Chicopee that the manufacture of golf and tennis balls, is centered, the plant there being one of the largest units of the company, which also maintains branch factories at Wakefield, in this state, and in Brooklyn, Philadelphia, Chicago, San Francisco, Brantford, Ontario, and in London, Paris and Melbourne, with a chain of seventy retail stores in the United States, Great Britain, France, Belgium and South Africa.

It is most significant that if Massachusetts is not a satisfactory state in which to carry on manufacturing activities, as has been asserted so many times by some of our critics, for years past an increase of at least 10 per cent in the production carried on at the Chicopee plant should be reported, and that today 1,200 persons are employed there by the company.

It was in 1876 that the company was incorporated, and in the intervening years it has grown until today it operates eight factories in the United States, one in Canada, and four stores; one factory in Great Britain, as well as a tannery and three stores; one plant in France, with one store and one factory in Australia, with two stores.

In 1929 two additional stores were added to the unit in which the polishing operations are carried on, affording 10,000 more square feet for manufacturing.

The Chicopee plant has 308,000 square feet of manufacturing space, and golf and tennis balls, ice and roller skates, golf clubs, tennis rackets, skis and gymnasium and play-ground apparatus, are produced there. The concern is capitalized for $10,766,000.

SOME OTHER LEADING INDUSTRIES IN CHICOPEE

Among other progressive manufacturing enterprises in Chicopee are Asinof & Sons Manufacturing Company, Inc., with capital of $250,000, employing 700 operatives in the manufacture of boys' and students clothing, with Jessie Asinof as president, Morris Asinof as vice president, and Moses Asinof, as treasurer; The Dana S. Courtney Company, capitalized for $500,000, manufacturing bobbins and spools, employing 150, and managed by John F. Moors, president, and F. H. Nesmith, secretary and treasurer; the Hampden Bleachery, at Chicopee Falls, owned by E. J. O'Neil, employing twenty-five, engaged in bleaching canton flannels; the Holyoke

Box & Lumber Company plant, located at Willimansett, employing twenty-five, in the manufacture of box shooks, C. F. Schuster being president and treasurer, and E. M. Chapman, secretary; the plant of the Holyoke Brick Company, employing fifty operatives; one of the two plants of the Moore Drop Forging Company, the other being in Springfield; the National Scale Corporation, with capital of $140,000, employing sixty in the manufacture of counting, weighing and elevating machines; the Page Paper Box Company, employing thirty operatives in the manufacture of paper boxes and managed by H. F. Benoit, president, and G. K. Page, treasurer; Rauch & Lang, Inc., incorporated in 1920, with $5,000,000 capital, employing seventy-five in the manufacture of electric and gasoline automobiles, and which, in 1928, filled many large orders for bus bodies and police ambulances, R. W. Stanley being president and treasurer, and I. I. Stanley, secretary; the main plant of the Springfield Provision Company, with 325 employees, purveyors of food products; The Palmer Steel Company, Inc., with capital of $200,000, employing 100 operatives in manufacturing fabricated steel structures, and having its main office in Springfield; one of the plants of the Hampshire Brick Company, located at Willimansett; the Springfield Facing Company, whose plant at Willimansett, capitalized at $125,000, produces foundry facings and supplies and the Warren Manufacturing Company, with capital of $200,000, employing thirty operatives, in the manufacture of factory trucks and trailers, and managed by Leicester Warren, president and treasurer.

In 1927, the total number of manufacturing establishments in operation in Chicopee, was fifty, representing a capital investment of $56,189,659. The total value of all products manufactured in these fifty enterprises was $72,859,894, and the value of stock and materials used in manufacture was $42,955,862, and the difference between these amounts ($29,904,032) represents the *value added* by the various manufacturing processes. The average number of wage earners employed during the year was 9,558.

The industrial growth of Chicopee during the seven years from 1921 to 1927 is clearly evident when one analizes the production figures.

In 1921 the value of all the manufactured products fabricated in the city was $48,525,442; in 1927, the value was $72,859,894. In 1921 there were 8,332 wage earners to whom were paid $9,731,892, in wages, while in 1927 there were 9,558 employees, who received $12,298,889, in wages.

The value of the stock and materials used in 1921 was $23,042,109, while in 1927 the value of stock and materials used was $42,955,862.

CHAPTER XXIX

WESTFIELD

SEAT OF WHIPS AND BICYCLES

Of the backgrounds of industry, of that great group of inventors who designed machines to supplant the tedious and uneconomic hand labor, of those hardy industrial pioneers who built that we might live, of the struggle to create and extend benefactions to the human race, as well as of those present-day industrial developers who are shaping the lives of the present generation the chronicles applying to the rise, growth and progress of the city of Westfield are typical of the transition that has taken place in Massachusetts.

One hundred and fifty years ago Westfield was a strictly farming community, its extensive alluvial area giving it an attribute not possessed by some of its sister communities. In 1801, Titus Pease and Thomas Rose were manufacturing whips, in the town, and as early as 1808 Joseph Jokes began making whips there, with hickory sticks, to which, by a "loop" or "keeper," a lash was fastened.

Hiram Hull began the manufacture of whips about 1810, employing women and girls to braid whip-lashes from strips of sheepskin, selling or bartering the product to neighboring farmers, who attached them to whip-stocks. By 1840, Hull was employing forty hands, and seven years later Liverus Hull, son of the founder, was admitted to partnership in the firm of H. Hull & Son, In 1855 a consolidation of the concern with W. Harrison & Co., its principal competitor, established in 1827, was effected, and the American Whip Company was organized, which, in 1893, became the United States Whip Company, most of the units then operating in the city entering the merger.

That year, Liverus Hull, who had become interested in improving the machinery and method of whip manufacture was granted his first patent upon an improved machine for sewing rattan, a material generally employed in making whip-stocks. On August 7 and October 30, 1855, he was granted patents on improvements in braiding-machines, and in 1864, 1865, 1866 and 1867, other patents were given him on improved devices for tension in braiding machines, and on looms adapted to elastic weaving, as well as on an improved method of covering whip-stocks, and on a new method of tapering the stocks. Liverus Hull was a versatile inventor and secured many patents between 1862 and 1868 on processes and machines for manufacturing rubber, woven and braided elastic fabrics, spring-bed bottoms, gas fixtures, chandeliers, bronze products, and special springs.

In 1855, Dow & Gillett employed 100 hands, and produced $55,000 worth of whips annually; J. & R. Nobel, established in 1834, had 100 operatives, and manufactured $50,000 worth of whips each year; William Robbins & Co. carried 100 men on its payrolls; H. Harrison & Co. employed 350 operatives and made $150,000 worth of whips a year; J. R. Land & Company, founded in 1835, had seventy employees and produced $60,000 worth of whips annually, and Messrs. King & Avery, R. Loomis & Co., and Munroe, Brown & Co., were among the other local whip concerns of size.

Ere the first half of the nineteenth century had passed, the whip barons of Westfield were coining money, and their contented employees were building attractive homes in various sections of the growing municipality.

When the great Southern statesman, Henry Clay, left his Kentucky home to campaign in the North in his quest of the Presidency, he included Springfield in his itinerary. Anticipating the arrival of this momentous occasion, the manufacturers of Westfield set about making a whip designed to be presented to the statesman. A selected delegation of the town's leading citizens carried the product to Springfield, where it was presented and received with speeches befitting the occasion. William Gelston Bates, of Westfield, a youthful and national member of the bar, did the honors for the manufacturers and Mr. Clay responded with the assurance that the whip would be swung over the backs of some of his high-bred Kentucky steppers, and that in the event his political opponents kicked over the dash-board, he would apply the lash in generous measure. Even in these early days the "whip-de-luxe" had attained high development, and the product presented to Mr. Clay was adorned with an ivory handle, elaborately carved by a master workman, the body being made from a selected piece of solid whalebone, inlaid with ivory knots. Several hand-chased mounts of solid gold gave brilliance and distinction, and the whip was tipped off with a buckskin lash, braided by the town's most skilled worker, and at the small end was a silk snap of striking color.

Nobody suspected in the first decade of the nineteenth century that up to the present day Westfield would be internationally known as the Whip City of the universe, and would produce 95 per cent of all the whips made in the United States.

Such a reputation was not thought of even as late as the period when the plaiting machines for covering stocks were brought to Westfield from Germany and England, and here is another instance where a Massachusetts town, which subsequently became one of her thirty-nine cities, would not have taken rank in the industrial world as the municipality in the United States where more whips were turned out for decades than were manufactured in any other place had it not been for the fact that the traditional skill, ingenuity and genius of Hampden County inventors and mechanics so improved the imported machines as to center the whip industry in Westfield, and thus encourage the birth of thirty-three firms or corporations, all of which were exclusively engaged in turning out 2,000,000 whips annually at the beginning of the present century, and of that total the United States Whip Company, the largest of them all, was contributing a million a year.

In the heyday of its prosperity, the local whip producing concerns with their approximate annual production, and the number of employees carried on their rolls, included the following: Westfield Whip Company, 25,000 whips, 100 hands. E. B. Light & Co., 2,500 whips, twelve hands. Pratt, Atwater & Owen, 13,000 whips, twenty-five hands. C. M. Whipple & Co., 2,000 whips, seven hands. D. N. Goff & Co., 1,000 whips and 2,000 patent leather handles for other firms, two hands. Sperry & Smith, 5,000 whips, twelve hands. Dibble & Randall, who produced "stock" for 22,000 whips and employed six hands. Bishop, Beals & Co., 1,200 whips, five hands. Whipple & Son, 45,000 caps and 10,000 silverplated ferrules for whip manufacturers, employing twelve hands. C. W. Spencer, 1,200 whips, five hands. Cowles & Atwater, 800 whips, four hands. A. & D. Avery plaiting 40,000 whips for manufacturers, and employing twenty hands. E. Sizer plaiting 8,000 whips and 2,400 snaps, and employing eight hands.

Danks & Co., 1,000 whips, three hands. Fuller & Cooper, 1,200 whips, four hands. O. Breckenridge, 7,200 whips, five hands. William Provin, 5,000 toy switches, two hands. Charles Hadley, 2,000 whips and 12,000 lashes, five hands. The Mundale Whip Company, 1,700 whalebone and 1,700 rattan whips, ten hands. Joseph King & Son, 22,000 whips, chiefly rattan, twenty hands. L. W. Lambson, 1,000 whips, three hands. The American Whip Company, the largest concern of its kind in the world at that period, employed 200 hands, making all its silver ferruling, plaiting, stocking, etc., by improved machinery designed for the purpose, and on which it held patents and allowed no other companies to use. It made 27,000 bone, 5,000 leather, and 15,000 rattan whips in a year. G. S. Peck, 2,100 whips, twelve hands. Shepard, Holcomb & Cook, making monthly about 2,500 bone whips, as well as whips manufactured outside their shop. They employed twelve hands.

THE METAMORPHOSIS OF THE INDUSTRY

One day a Westfield whip-maker stood at his lathe, turning off the shavings from a roughly-formed piece of rattan "stock." That same day, in a far-distant Michigan city, a machinist stood at his lathe, turning off shavings from a piece of steel, designed to be a part of a transportation device, whose influence upon mankind was to be international. That machinist was none other than Henry Ford, whose every turn of the arbor of the lathe, delivered a solar-plexus blow to the whip industry of Westfield.

The completed automobile was destined to crowd the horse from the world's highways, and its advent in ever increasing numbers, witnessed the dwindling of the demand for whips, which had been universal.

WHAT HAS HAPPENED IN THE FIRST QUARTER OF THE PRESENT CENTURY

In 1900 it seemed inconceivable that within a quarter of a century the American and world market for whips would be so affected by the development of a new method of transportation as to seriously threaten the perpetuity, continued growth and financial success of the more than a score and a half units then engaged in the manufacture of these commodities in Westfield.

But the increase in the production of automobiles and the rapid decrease in the number of horses soon indicated that manufacturers of whips must turn their plants over in part or in whole to other types of production, or go to the wall. Did they bemoan their fate, sit idly by, and await the cataclysm?

Hardly! Such was not the temper of Westfield's manufacturers. That attitude did not represent the Massachusetts spirit.

Quietly and without despairing they looked about, analyzed their equipment, studied the trend of the commodity market, and gradually turned their plants and machinery over to the production of manufactured articles where a certain future was observed in the offing.

The industrial metamorphosis of Westfield is comparable to what was accomplished in Amesbury, Merrimac, and other Essex County towns, where the manufacturers of buggies, phaetons, and hacks, turned to automobile bodies; and to Leominster which changed from horns and hoofs to pyroxylin products; to New Bedford which took up the production of fine cotton cloth and became the center of that type of textile production when whaling no longer afforded a new dollar for an old one, and to

Salem, whose merchant princes sold their sailing argosies and put their profits into cotton sheetings.

Today, Westfield has but three concerns engaged in the manufacture of whips, and even some of these do not devote all of their production to this line, but have equipped their plants with machinery designed to manufacture allied goods, yet in 1928, the whip industries of the city manufactured approximately 2,000,000 whips, as against a production of 7,500,000 a year prior to the advent of the automobile.

THE UNITED STATES WHIP COMPANY

Indicative of the fact that the whip concerns do not consider themselves "whipped" simply because the demand for their products is lessening, is the action of the United States Whip Company, which, seeking profitable auxiliary lines and with its fishline business well established, has recently entered on the manufacture of golf clubs, systematic production now being under way. The plant is equipped to produce 500 daily.

New departures are represented by the golf goods of this company. One of the leading specialties is a stick with a bamboo shaft and a hickory core with spring-steel wire center. This combination is said to give greater resiliency and strength. The weight is about the same as that of other lines.

The company was attracted into the golf goods field by the great and ever-widening demand for such commodities, and it is expected that the new line will prove a valuable factor in the company's prosperity.

Production of fish lines by this company dates from 1923, and it is said that substantial gain has been made each year in sales. This commodity is marketed by the branch concern known as the United States Line Company. Thirty salesmen are employed in every state of the Union.

Fish lines produced by this concern are of high-grade silk, the raw stock, known as premium silk, being obtained from Japan.

The fish line is made by braiding sixteen silk threads, each composed of three strands and each strand of three single threads. The finished line contains 144 single threads, each composed of from five to eight cocoons of silk and each pound of finished silk is said to represent 3,000 cocoons.

Four hundred braiding machines are in use at the plant, some 6,000 square feet of floor space are used, and during six months of the year the work is carried on twenty-four hours a day.

The United States Whip Company is capitalized for $750,000, employs 200 operatives and produces between seventy-five and eighty per cent of all the whips manufactured in the United States.

F. L. Parker is president, Robert Hale, secretary and Leigh Sanford, treasurer.

THE H. B. SMITH COMPANY

In 1853 Henry B., and Edwin Smith began in a small way, under the name of the H. B. Smith Company, to manufacture iron fences. Seven years later they added boilers to their line of products, and it is rather interesting to note how this new line of manufacture came about. A Harvard professor, by the name of Gold, invented a small steel boiler for house heating, and made arrangements with a Connecticut concern to manufacture it, but a disagreement followed, and Gold took his patents and models, loaded them on a barge and embarked upon the canal, which, at that time, paralleled the Connecticut River, in search of somebody to manufacture his boiler.

The second evening of his journey found him in Westfield, where he discussed with Henry B. Smith the subject uppermost in his mind, with the result that the interview marked the first step in the development of the world's largest manufactory of cast-iron boilers and radiators.

The Messrs. Smith in the meantime had acquired the business of Lyman and Thomas A. Lewis, who manufactured stoves and who carried on the work in a three-story building, on Main Street, in Westfield.

The first cast-iron steam boilers produced by the company were set in brick chambers with heating pipes or radiators over the chambers bolted together. Air was passed through the radiators and hot-air pipes which conveyed the warm air to the rooms that were to be heated. This was a new idea, and conservative New England had to become acquainted with the advantages of this method of heating. Some persons were at first afraid to use the boilers, for there was no such thing as low pressure safety steam valves when they were placed on the market. But Henry B. Smith was not fearful of prejudices and cast-iron boilers gradually came into general use. It was a long step from the Gold type of boiler to the present Mills and Smith water tube principle, with the fire surrounding the tubes, and it was not taken at one leap. But through all the developments may be seen the guiding hands and the courage of Henry B. Smith and John R. Reed.

Early in the progress of the business, the latter became a member of the firm, and played a prominent part in its management and development. Fourteen hundred persons are employed at the Westfield plant, and the foundry melts over two hundred tons of pig iron daily. In 1878 the partnership was merged into a corporation, which is now capitalized for $1,000,000.

The company manufactures cast-iron boilers and radiators for all heating purposes, from the smallest cast-iron tank heater to the mammoth heating boilers required in the largest buildings. Sales are made only to the heating and plumbing trade and the concern makes no direct installations. Smith boilers and radiators have long been universally recognized as quality products.

In 1918 a large and most attractive office and warehouse was erected at the corner of Main and Portland streets, in Cambridge, and the eastern sales office of The H. B. Smith Company was established there. A large and complete stock is maintained, and a spur track from the Boston and Albany freight yard assures prompt service in freight shipments.

The first boiler built under the Gold patent now occupies a prominent place in the Kendall Square showroom and presents an interesting contrast to the modern boilers on exhibition there.

Offices are also maintained in New York, Boston, Philadelphia, and Cleveland, and the company markets its products in many foreign countries. W. T. Smith is president, S. K. Smith, secretary and Edwin W. Smith, treasurer.

THE EVOLUTION OF THE AMERICAN BICYCLE

Practically every phase of the evolution and remarkable development of the bicycle in the United States has been confined to Massachusetts, during the past fifty-three years.

About the beginning of the nineteenth century, crude and awkward vehicles were exhibited in Paris, but none proved practical and they were soon forgotten. For about seventy years thereafter occasional examples of inventive progress in connection with the development of the tricycle

and bicycle were observed, followed by long periods when these products were entirely neglected.

It was not until the last quarter of that century that the era began that culminated in the pioneer bicycle of America—the Columbia. In the seventies, Col. Albert A. Pope, the founder of the bicycle in this country, and later the pioneer in the good roads movement, became intensely interested in developing the bicycle as a source of health and recreation, as a means of overcoming distance, and as a vehicle adapted to the uses of man, woman and child. He visited Europe for the special purpose of studying the device, which was then being turned out in limited quantities on the Continent, and with a view to determining the most satisfactory pattern to adopt in popularizing this means of locomotion in the United States.

COL. ALBERT A. POPE OF BOSTON—THE PIONEER

The train of thought started in the mind of this alert young Bostonian at that time was destined to work a revolution in modern life and incidentally was to transform a young man of thirty-three years, who, before fighting for his country in the Civil War, had begun life without wealth, into a multi-millionaire.



COL. ALBERT A. POPE, Boston, Founder of the Bicycle Industry in the United States.

In 1877 Colonel Pope organized the Pope Manufacturing Company, now known as The Westfield Manufacturing Company, and established headquarters at 87 Summer Street, Boston. About that time he placed a small manufacturing order for Columbia bicycles with the Weed Sewing Machine Company, of Hartford, Conn. Thus was born the famous Columbia bicycle and what was destined to become one of the great industries of America.

At the outset, Colonel Pope committed himself to certain definite business principles by which he was guided in the conduct of the then infant industry. He resolved to make a quality product, believing that lacking such a foundation there could be no lasting success and he determined to advertise it well, and to market it to each and every customer at the same price.

These ethics adopted by him and adhered to throughout his career explain in part at least why the Westfield Manufacturing Company is today the largest industry of its kind in the United States. From that day

to this, a span of over a half century the Columbia bicycle has been the leader and is universally known for its high standard of quality.

After the first year or two the demand for American-made bicycles increased rapidly and it was not many years before the country took up riding as a fad.

It is interesting to note that the price advanced steadily from 1878, when the Standard Columbia sold for $80 to $90, to 1893, when the best Columbia sold for $150. For nearly ten years after the chief patents had expired, the price continued to advance. This is perhaps unparalleled in the history of industrial products, but people demanded better machines, lighter and capable of more speed and were willing to pay for them.

Bicycle clubs and bicycle races came into favor early and were sponsored by Colonel Pope with enthusiasm. The first club was formed in 1878, in Boston, and one of the first bicycle races was held the same year in South Framingham. Clubs and races no doubt did much to advance the popularity of the bicycle, but the cycling and trade journals that were founded about that time were a contributing factor.

CONQUERING ANOTHER ENGINEERING PROBLEM

American ingenuity and the determination to excel soon gave the American public better machines than could be purchased abroad and made it possible to enter the foreign field. The number of Columbias shipped abroad each year increased rapidly and although foreign manufacturers eventually installed our advanced types of machinery which, coupled with the low price of labor across the water, enabled them to make lower prices, the market for Westfield-made bicycles in some foreign countries is still a factor in the industry. In fact, thousands of Westfield-made bicycles are shipped yearly to foreign markets.

At the start the manufacture of Columbia bicycles presented a complicated engineering problem but steadily the evolution went on until the Columbia was pronounced a perfect piece of mechanical engineering genius.

In 1878, Colonel Pope issued his first regular trade catalog, made his initial shipments, and began national advertising.

In 1879, 1880 and 1881 he established the agency and uniform price systems, brought out new models, introduced the Columbia ball bearings, and instituted the guarantee system.

In 1882 the Expert Columbia was launched—the first bicycle to be ridden around the world, and that year, too, he established his first branch house.

In 1883, 1884 and 1885 came the Columbia racer, the light roadster and the two-track and three-track tricycles.

In 1886 appeared the Columbia safety bicycle, the front driven and other models, and that year the world's record of a mile in 2 minutes, 29 4/5 seconds, and twenty-two miles within an hour, on Columbia racers, were made.

From 1887 to 1890 he introduced the Columbia tandem, the racing and light roadster tricycles, the rear driving safety bicycle, the Columbia light roadster safety, and tandem safety, and the women's safety, and cushion tires first appeared on the Columbia products.

In 1891 the world's record of a mile in 2 minutes, 15 seconds was made on a pneumatic racing safety Columbia wheel.

In 1892 Colonel Pope erected his new Boston headquarters, on Columbus Avenue, with offices, sales room, riding school, and repair shop, and

brought out a number of new models, and the following year the Columbia tube mill was completed and placed in operation, where all tubing was produced.

Between 1894 and 1896 a new office building was erected at Hartford, Conn., and many new improvements and new models were introduced.

In 1897 the Columbia bevelled gear chainless model was announced, and the following year the world's record of 250 consecutive century-runs (100 miles) on the road was established by a Columbia bevelled gear chainless model.

In 1899 a mile record of 1 minute, 21 seconds was made on a Columbia model, and The American Bicycle Company was acquired by the Pope Manufacturing Company.

The next year the Columbia tire coaster brake was introduced, and at the Paris Exposition the Grand Prix was awarded to the Columbia bicycle.

THE CONCERN MOVES TO WESTFIELD

From 1901 to 1905 wonderful advances were made by the Columbia management, including the cushion frame, the Columbia hub coaster brake, the Columbia two-speed gear, the Pope coaster brake, the Pope cushion fork, and the purchase of the Pope Manufacturing Company, by The American Bicycle Company, including the Westfield bicycle plant, where such well-known makes of wheels as Cleveland, Tribune, etc., were being manufactured, and factories at Chicago, Hagerstown, Md., and other cities.

In 1906 the manufacture of Columbia bicycles was transferred from Hartford to Westfield, and shortly afterward other bicycle-producing units were moved there. Many trade-mark brands were included in the purchase of the previous year, and those that were the most popular were continued in production, including the Cleveland, Tribune, Rambler, Crescent, and Pope types.

The transfer of all manufacturing activities to Westfield was immediately followed in 1907, 1908 and 1909 by the introduction of new and improved models, and in an auto-paced race, E. J. Collins rode a mile in 58⅜ seconds, on a Columbia racer.

In 1910 the manufacture of the Pope Motorcycle was begun, at Westfield, and was continued until 1918. In 1911-1912 new and improved models were brought out, and the following year the general offices were removed from Hartford to Westfield.

In 1915 the general offices were materially enlarged and the manufacture of shells for the Russian Government was added at the Westfield plant.

AIDING WAR PRODUCTION

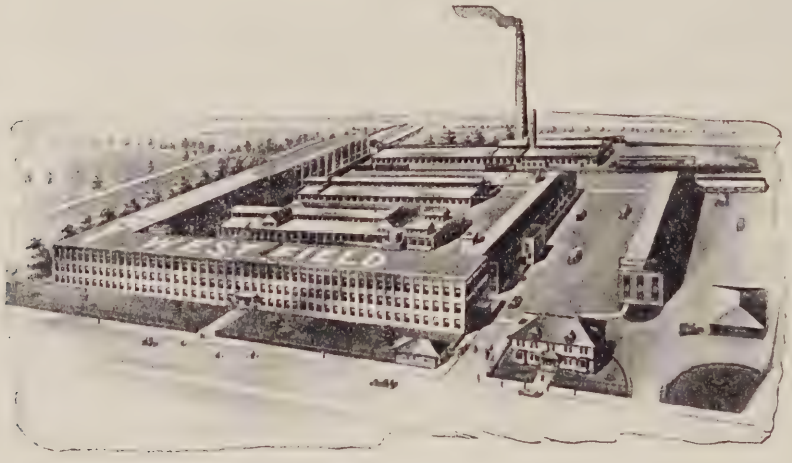
In 1917 large additions were built at Westfield, and the Columbia military bicycle was chosen as the standard for the United States Army by the United States transportation experts. Many thousands of these bicycles were sent to France, and that year ushered in the local production of high explosive shells for the United States Government, at the Westfield factory.

In 1918 the factory area was vastly increased and the production of gas shells for the United States Government was begun. Upwards of $1,000,000 was expended on buildings and equipment in 1917 and 1918, and it is an historical fact that every American-made gas shell hurled by our army in France, was manufactured in the Westfield plant. While other

American manufacturers held contracts for gas-shells the products did not reach France until after the armistice.

The next year the manufacture of children's Columbia cycles was inaugurated, and in 1920-21, new and improved models of all the types of bicycles were introduced.

In 1922 further extensive additions were made at the Westfield plant, and a simplification of styles and models introduced, with reductions in prices.



PLANT OF THE WESTFIELD MANUFACTURING COMPANY, WESTFIELD

Not often in this era of the automobile do we give consideration to a commodity which, up to 1910 and even later, constituted one of the most popular and efficient modes of transportation known in the world, and in the production of which America took first rank, even as she does today in the automotive field, while Massachusetts and New England were the seats of quantity and quality bicycle production.

STILL THE DOMINANT UNIT IN THE INDUSTRY

Today the Westfield Manufacturing Company capitalized for $1,000,000, employs 800 hands in the manufacture of bicycles and children's vehicles and is the second largest industrial unit in the city. There were shipped from its factory in 1927 more than 125,000 bicycles, in addition to the other commodities turned out by it. In its heyday, at the very height of the bicycle craze, the plant rarely reached a capacity of 60,000 machines annually. Indicating that there is a future in bicycles, the Westfield Company has absorbed three large middle western competing firms during the past five years and consolidated their manufacturing activities in Westfield.

In 1925, the company organized a subsidiary concern, the Columbia Wheel Company, to develop a new composition product known as "Rubwood."

The parent company is the largest manufacturer of bicycles in the world, and it is quite significant that for the fiscal year ending August 31, 1928, its sales were the best on record, aside of course, from the war period when the plant was engaged in government work. It makes almost half of the 250,000 to 300,000 bicycles manufactured annually in the United

States, and occupies a commanding position in the production of tricycles, scooters and other children's vehicles.

Sales of the latter commodities increased in 1928, 67 per cent over the 1927 figures. In 1928 the corporation declared a 100 per cent stock dividend.

Those whose observations are confined mainly to city streets and who imagine that the bicycle has practically passed out of use, should journey to Westfield and secure an inside view of the plant of the Westfield Manufacturing Company, where these machines are produced at the rate of 400 a day, and where as many as 12,000 bicycle frames are to be observed in various stages of manufacture. One of the company's recent publicity features was the "Columbia Santa Claus" radio talks, broadcast from one of the New York City studios.

It is rather significant that while the demand in the United States for bicycles reached its peak towards the end of the last century, and while for a number of years thereafter, that volume decreased, the production of Westfield-made bicycles has been above normal for many years. Furthermore, the cycles turned out by the Westfield Manufacturing Company are better intrinsically and mechanically than in the old days, and sell for nearly 75 per cent less than they did at the peak period of demand.

The company's payroll is the second largest in Westfield.

THE INFLUENCE OF THE AUTO ON BICYCLES

While the bicycle has become standardized in a large degree, new features are still introduced from year to year. Styles to some extent are influenced by current automobile modes. A feature of the 1929 bicycles put out at Westfield was the chromium finish applied to the nickel parts, a complete chromium plating department constituting one of the recent factory developments. After the regular nickel plating has been applied the parts are given a chromium bath, producing a high lustre and slight bluish cast, with a hardened surface that makes for long wear, protects against scratches and is not subject to tarnish.

In one way the automobile has had a great deal to do with curtailing the use of bicycles within certain areas, both by supplying a substitute and increasing traffic congestion in a manner that causes many city residents to regard bicycle riding to and from work as inconvenient. But in another way the automobile serves to make bicycles more popular. The desire to ride on wheels is even keener today than it was in the nineties, when bicycle riding was in its heyday as a fashionable pastime. And with the older members of the family using the automobile, the determination of the younger members to possess and operate some kind of wheel vehicle is stronger than ever.

As cities grow and business interests press upon residential areas, people seek homes outside and suburban areas are extended farther and farther from the business centers. There, in the open areas, with improved walks and roads, ideal conditions are afforded for bicycles and children's vehicles of various kinds, and the bicycle is still used by many grown-ups, both as a utility institution, as in riding to work or to the neighborhood store, and as a means of exercise, for physicians still recognize bicycle-riding as one of the healthiest forms of activity.

Even in the cities, more persons use bicycles than is commonly supposed. They are employed by many factory workers as a regular means of getting to and from their places of employment and they are still a common reliance of telegraph messengers everywhere.

To go along with the bicycle the company has developed a line of vehicles for juvenile use, comprising numerous types and styles, and having a family resemblance to the bicycle. Taken collectively, these products are a big factor in the amusement and health of the rising generation. They provide an incentive for keeping the youngster healthfully employed in the open air, when other attractions fail. Shipments from the Westfield factory, in 1929, were 50 per cent larger on this type of product than during the previous year.

The company's plant covers a large ground area, and in 1928 an addition 200 feet long by 50 feet wide was completed. In a large square are grouped the numerous brick structures where the various processes of bicycle manufacture are carried on, starting with the sheet steel as it comes from the steel mills to be transformed into tubular forms for frames, and the other materials that entire into the product. More than ever before, color is an attractive element in the makeup of a bicycle, and the big rooms where finished parts are on view provide a veritable feast for the eye.

One is led to wonder where so many bicycles find users. The great bulk of them are sold in this country, as the export trade in bicycles is a much smaller factor, proportionately, than in the automobile and motorcycle fields.

Models of bicycles addressed to various needs are produced in styles and weights of sufficient diversity to please all tastes. Along with the sturdy roadsters go the light, graceful vehicles for women's use, the motorbike models, the various styles for boys' and girls' use, the special delivery model, and the racing bicycles, the last word in balance and smoothness, built light and strong to meet the demands of racing service.

The officers of the Westfield Manufacturing Company include: president, Wilbur C. Walker; vice president and general manager, John P. Fogarty; treasurer and chairman of the board of directors, Stephen C. Millett; secretary, Norman R. Clarke; assistant treasurer and clerk, Cuthbert P. Gorman; assistant secretary, Leon D. Harden; manager of sales, Emmett M. Jackson.

ANOTHER LOCAL INDUSTRY THAT SUCCUMBED TO ALTERED CONDITIONS

Early in the nineteenth century the discovery was made that the valley of the Woronoco River, with its terrain of fertile land, was peculiarly adapted to the culture of tobacco suitable for use in the manufacture of cigars.

A small group of expert cigar makers was induced to come from the East side of New York City to Westfield, and formed the nucleus of the large colony which in later years produced more cigars in the town than were fabricated in any other municipality in Massachusetts.

In the early seventies Westfield boasted of upwards of thirty cigar manufacturing enterprises, producing all the way from 10,000 to 2,700,000 cigars per year. Included in the list, with the monthly output, were the following units: C. M. C. A. Company, 224,300. Thayer, Waterman & Beckman, 121,464. Shafhirt & Freed, 42,100. M. Worthington & Son, 29,000. Jacob Heidenger, 3,000. T. F. McMain, 38,900. James N. Lewis, 18,450. Alonzo Tillitson, 1,750. Barkley & Murdock, 6,300. Justin Granger, 1,500. J. Whitney Root, 34,600. Enos K. Maugle, 2,200. Mrs. C. E. VanDeusen, 6,000. J. H. Smith, 5,000. Charles K. Clark, 2,100. James Brady, 900. George Willis, 4,000. Hampden, C. A., 56,800. Clark M. Adams, 4,300. Union C. M. C. A., 120,600. George Phillips, 5,900. Bush,

Ensign & Chase, 52,000. Hiram Freed, 4,800. Meeker & Bowers, 23,400. John Connell, 11,700. Knoop & VonCamp, 7,350. H. C. & E. Allen, 15,100. Sullivan & Allen, 27,700. Aaron Marks, 1,500. Bryan, Keefe & Co., 77,800. Lizzie Chester, 1,000. Andrew Huck, 7,600. George White, 5,700. H. S. Woolworth, 2,773. Adams Rhin & Co., 10,500. Dickinson & Asher, 98,832.

Not one of these concerns or individuals is now in existence. The industry dwindled locally, due to a variety of causes—competition, inducements to locate elsewhere, the adoption of improved machinery and new processes of manufacture, and more recently, the universal use of the cigarette.

THE CHANGING TIDE IN LOCAL INDUSTRIES

The necrology of industries in Westfield is not unlike that one finds in every manufacturing town and city where he scans the pages of history.

In 1897 the Lozier Manufacturing Company began business in the town, the concern being reorganized three years later under the name of the American Cycle Company, and at the height of its career it was turning out 30,000 wheels a year, and employing all the way from 400 to 800 men. Soon afterwards the E. J. Moore Manufacturing Company began the local manufacture of automobiles as if to add to the irony of fate and further jeopardize the fortune of the whip business. In 1899 the Loomis Manufacturing Company came into being and the American Casket Company was employing from fifteen to twenty-five hands at about the same time in the production of casket handles and trimmings.

For over fifty years the A. E. Ensign Box Company produced cigar boxes and in 1890 the Columbia Photo Paper Company was incorporated and operated a plant at Springdale, where a ton of specially prepared paper was produced each day, this mill being considered at that time as the only one in the United States in which rag paper was made and completely finished for photographers. Not one of these concerns exists today, but in their places have appeared two or three new local corporations to every one that existed in the last decade of the nineteenth century.

THE PURE FOOD TOWN OF THE UNIVERSE

When Westfield began to cast off its fame as the "Whip City" it did not lose its reputation for being the center of a given type of product as it then became internationally known as "The Pure Food Town of the Universe," due in no small measure to the interest developed in food standards by Prof. Lewis B. Allyn. Immediately following his revelations, which occupied countless pages of magazines and newspapers for a long period of time, there grew up several food companies, whose products attracted nation-wide attention, and the city became the seat of diversified industries.

One of the leading pioneers in the field of vitamins is the Vitamin Food Company, incorporated in 1921, and whose principal product is Vegex Vitamin Yeast Extract, which has gained wide distribution in this and South American countries, the concern having supplied most of the yeast to the South in the campaign of the American Red Cross against pellagra. In 1928 the concern entered into a merchandizing alliance with the United Drug and Sterling Products groups, and now has upwards of 100 employees.

Robert M. Allen is president, Alfred W. Huge, secretary, and Edward A. Rumley, treasurer, of the corporation. It has capital of $1,000,000 preferred and 100,000 shares of no-par common stock.

Certified Foods, Inc., a $295,000 corporation, with Herbert F. Osteyee,

president and Winthrop J. Nottage, treasurer, also manufactures food products.

THE OLD COLONY ENVELOPE COMPANY

One of the fast growing manufacturing enterprises of the city is the Old Colony Envelope Company, capitalized for $200,000, employing 300 operatives, in the manufacture of envelopes and announcement cards. F. A. Juckett is president, J. W. Joslyn, production manager, R. H. Lockwood, treasurer and advertising manager, Eugene R. Atwood, purchasing agent and sales manager, J. N. Fountain, plant superintendent, and L. D. Parker, assistant advertising manager.

Within recent years the concern has brought out a novelty for the holiday seasons, consisting of "Off Square" envelopes, of various shapes and sizes, with cards to match—an idea new in the commercial field, and one which was patented.

The innovation fits in with the modernistic school of design and special machines were invented and built at the plant to care for quantity orders, which began to flow in 10,000,000 lots when the products were introduced.

The company had previously patented an art inlay process of printing the inside of envelopes in three colors at one run, and for more than a year the concern has operated night shifts to care for production.

In 1928 the Strathmore Paper Company acquired a large stock interest in the Old Colony Envelope Company, and the following year there were erected two four-story additions, including an office building 56 by 44 feet. On the north side of the old plant a manufacturing structure 200 by 76 feet was built, thus giving the concern a symmetrical unit, with a frontage on North Elm Street, of 175 feet.

This enlargement is to take care of the company's rapid increase of production. Sales the first three months in 1929 showed a 48 per cent gain over the corresponding period of 1928, as against an annual growth of about 20 per cent since the company was formed in 1922.

SOME OF THE CITY'S PROGRESSIVE CONCERNS

The Textile Manufacturing Company, which was incorporated in 1880, with $10,000 capital, since increased to $100,000, erected its present substantial factory in 1899, and employs upwards of 100 hands in the manufacture of casket hardware. The present officers are L. O. Peck, president; C. E. Coon, vice president, and F. C. Williams, treasurer and manager.

One of the city's fast growing and progressive manufacturing units is the Foster Machine Company, with capital of $450,000, employing upwards of 200 in the production of textile machinery.

About three years ago the concern began the manufacture of a new winder suitable for use on silk and rayon yarns, as well as cotton, and in 1928 and 1929 the sales on this item increased in various parts of the United States to such an extent as to have a notable effect on plant operations.

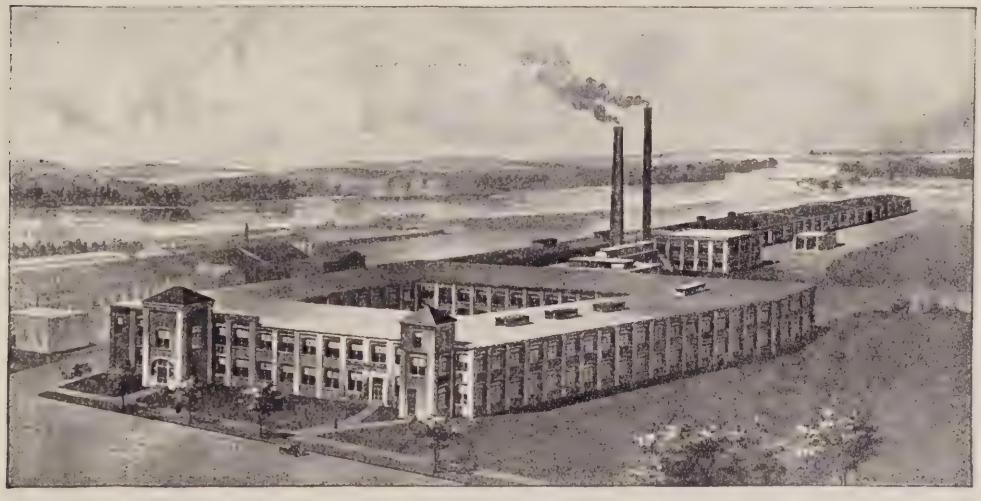
J. O. McKean is president, T. E. Conner, vice president, D. W. Bridgman, secretary, and E. T. Fowler, treasurer.

To the ordinary observer it would seem almost like "carrying coals to Newcastle," to remove a plant producing nuts that exclusively enter into automobile production, from Detroit, Michigan, to Westfield, yet that is precisely what the officials of the Westfield Nut Company, Inc., did in 1927, when it took over manufacturing space in the Westfield Steam Power Company's building, and once in production turned out 5,000,000 nuts per

month, all of the output being sold to auto producers, in Detroit. In 1928, within two years after locating in Westfield, the concern found it necessary to lease additional space, in order to install a machine shop, which it has equipped on regular lines to enable it to carry on its own maintenance.

The company has operated day and night shifts practically all of the time since it established itself in the city. Guy C. Worrell is president and V. Giler, treasurer.

The W. Warren Thread Company dates from 1893, when William Warren removed to Westfield, from Worcester, where he had disposed of a similar business carried on by him for years, in the latter city.



THE W. WARREN THREAD WORKS, WESTFIELD

Ray M. Sanford is president. A. B. Warren, vice president, and Charles B. Warren, treasurer, of the concern, which employs 200 operatives in the manufacture of cotton thread. The corporation has capital of $300,000.

On January 1, 1928, the company absorbed the Blodgett, Orswell Company, of Pawtucket, R. I., and installed in its Westfield plant a large quantity of special machinery that made it possible to add domestic threads to its line of products.

THE ATWATER KNITTING COMPANY

In 1896 the Atwater Knitting Company was organized and in the intervening years the concern has become a leader in the production of novelties in knitted coats, sweaters, bathing suits and children's garments. Its officers attribute its great growth in recent years to intelligent national newspaper advertising, and to the exploitation of its products by large department stores, chain stores and the large mail order houses of the country.

Collins Atwater is president and treasurer, and David Atwater is the plant manager and secretary. The concern, incorporated in 1916, is capitalized for $78,000, and employs seventy-five operatives.

A little more than fifteen years ago Charles H. Martin designed and developed the semi-trailer and fifth wheel, and organized the Martin Fifth Wheel and Trailer Company, carrying on manufacturing operations in Springfield and in Chicopee Falls until 1921 when he sold the assets of the

concern to Charles H. Harris, and others, who removed the business to Westfield, and established it in the factory formerly occupied by the Planet Manufacturing Company. The corporation changed its name to The Martin Trailer Company of which Howard E. Swift is president, J. R. King is secretary, and Charles E. Harris, treasurer.

In 1929, a brick and steel addition, of mill construction, 100 by 50 feet, one story high, was made to the plant.

That year, the corporation purchased the brick building owned by the Planet concern, and two acres of land.

Recently the company was commissioned to build eight semi-trailers of fifteen tons capacity for use in moving freight on the New York docks. Other semi-trailers are to be shipped into Pennsylvania for municipal use.

The Westfield company is building a new type of patented semi-trailer, in which the fifth wheel is located underneath instead of on top of the chassis, and by dropping a jack into place the trailer can be left with its load undisturbed and the truck released for other duty.

The concern has met with great success in its seven-ton truck, which is 35 feet in length, electrically welded and mounted on pneumatic tires. It can be made to transport forty tons by the use of twelve wheels instead of four. The front wheels being detachable, the vehicle may be readily utilized as a semi-trailer if desired.

The Robinson Manufacturing Company began business in 1913, with $70,000 capital, and has steadily increased its production of leather novelties, one of its latest products being a "Bill-Minder," designed to take care of the new small currency, which went into effect in July, 1929. The company maintains a New York office, and the officers are A. D. Robinson, president, H. S. Robinson, treasurer, secretary and manager.

For almost a century Westfield has been the center of organ building, William A. Johnson constructing his first church instrument in 1844, and building between that time and 1878 more than 500, of which total thirty-one were installed in churches, in Chicago. He was the inventor and patentee of many devices which added to the value and reputation of the Johnson organ.

The Skinner Organ Company, of Boston, operated one of its two Massachusetts plants in Westfield, until the close of 1928, taking advantage of the presence here of skilled local artisans who, through successive generations have become experts in the art of organ production. In that year all production was concentrated at its Boston plant.

In 1920, the New England Braid Company was established, and was incorporated six years later, with $200,000 capital, and manufactures braided shoe threads, upwards of 300 machines being included in the equipment.

In 1926, the New England Wire Company was incorporated by the officers of the former company, for the manufacture of insulated wire, and the plant is equipped with 300 braiders. In the fall of 1929 the Noma Electric Company and the Pilot Radio & Tube Co. jointly bought the New England Wire Company, the purpose being to give the Noma unit an unlimited supply of copper wire to carry on its expansion program.

H. A. Cowles is president, and George Rasmussen, treasurer and secretary, of these two corporations.

The American Abrasive Company, incorporated in 1918, is carrying on the production of natural and artificial corundum in grain form for use in abrasive operations, and in 1926 the concern erected four new buildings, which added 20,000 square feet to the floor space previously in use. It

purchased the brick structure, formerly owned by the Brien Heater Company and built a one-story building, 75 by 25 feet, where it stores its ore, which is delivered by tramcars which run into the building from a railroad siding.

Improved machines, built to order from the company's designs, have been installed and mark a gain in efficiency and economy, superseding the manganese rolls previously used.

The company prepares grain for the manufacture of sandpaper, abrasive cloth, grinding wheels and various devices employed to cut, reduce and shape articles of metal, glass, wood and various compositions, the products ranging in size from coarse-grained crystals down to fine, soft flour.

The raw material consists of both natural and artificial corundum, the former being brought from the Transvaal and Rhodesia, South Africa. Artificial corundum is made from bauxite clay, and this material is obtained from the Pyrenees region of Southern France, where the clay is rich in alumina. Before being delivered to the Westfield plant the clay goes through a process that separates the alumina oxide content from the ferro-silicon that accompanies it.

The company also operates a large plant in Amesbury, as with the growing activities of the Westfield factory it has not been practicable as yet to carry out the plan of consolidating production at one factory. With business increasing and with existing space utilized to the fullest, it is not unlikely that further expansion of the Westfield establishment will take place in the near future.

Louis M. Fuller is president and general manager, Hon. Harry B. Putnam, secretary and Harry E. Willcut, treasurer, of the corporation, which has capital of $100,000.

The Bryant Box Company began business in Westfield, in 1889, the original products being cigar boxes. Later paper box lines were developed and in 1929 new machinery was installed for the purpose of widening the company's range of paper box production through the further application of specialized machine processes. The plant is now manufacturing 10 per cent more than in 1928. O. B. Parks is president, A. G. Norton, vice president, and H. S. Miller, treasurer and manager.

OTHER FAVORABLY KNOWN WESTFIELD INDUSTRIES

Among other leading industries of Westfield are the E. F. Russ Company, of which E. F. Russ is president and treasurer, and which manufactures gelatine, glue and sizing, and in 1928 acquired the four-story building formerly owned and occupied by the Hampden Toy Company; the Vitrified Wheel Company, with capital of $260,000, employs sixty operatives, in the manufacture of abrasive grinding wheels, William B. McSkimmon being president, and R. J. Hein, secretary and treasurer of the corporation; the Westfield Clay Products Company, with capital of $150,000, employs fifty men in the production of face and common brick, Arthur B. Long, being president, and Darwin L. Gillett, treasurer, of the concern; and The Planet Company, with capital of $46,500, engaged in the manufacture of canvas and leather goods, employing fifty operatives, Robert Gowdy, being president, R. Alyn Gowdy, secretary, and C. A. Hickson, treasurer.

Moore & Kling, Inc., which within recent years opened a plant in the city for the assembling of gasoline pumps, has gradually increased production of a pump of special type, equipped with an electric meter.

In 1838, Homer Holland, of Westfield, was granted a patent on a

process of manufacturing paper from the leaves and husks of Indian corn, and no doubt this invention may have been responsible for the development of the paper industry, in the vicinity.

For many years Crane & Co., Inc., of Dalton have operated a paper mill in Westfield, in addition to its Pittsfield and Dalton units. The Merrick Lumber Company, of Holyoke has one of its Hampden County branches, in Westfield, and John S. Lane & Son, Inc., with capital of $392,000, employing eighty-five operatives, has its headquarters and one of its three Massachusetts plants, in the city. H. C. Lane is president, A. S. Lane, treasurer, and A. F. Eggleston, secretary of the corporation. The other units are in Amherst and West Springfield.

Cargill, Cleveland & Co., a partnership made up of Wilbur G. Cargill and Harvey J. Cleveland, employs thirty, in the production of whips; the Mars Paper Corporation, with capital of $100,000, employs fifty operatives in the manufacture of tissue paper, Maurice O'Meara being president, and Charles R. O'Neill, treasurer, of the concern; the Noble Cigar Company, of which concern James M. Noble is president and James M. Noble, Jr., secretary and treasurer, employs 150 operatives in the manufacture of cigars; the Peck Box Company, employs thirty-five, in the production of boxes and shooks, Abner E. Peck being president, H. T. Welch, secretary, and L. O. Peck, treasurer; the Peck Lumber Company, with capital of $300,000, employs 125 operatives in the manufacture of lumber and railroad ties, Abner E. Peck being president, H. H. Peck, secretary, and L. O. Peck, treasurer; and the Rogers Silver Company, of which Ralph G. Rogers is president and treasurer, and Mrs. H. R. Rogers, vice president and secretary, manufactures casket hardware.

The Beckwith Bros. Company employs thirty operatives, in the manufacture of piano keys, stools and novelty furniture, F. A. Noble being president, Harold E. Howard, secretary, and Robert E. Doherty, treasurer; the Colonial Art Company, owned by Edward E. Hamilton, produces price cards; the Edward F. Diehl Cigar Company, managed bq W. J. Mahoney, employs twenty in the manufacture of cigars; the Hampden Manufacturing Company, Inc., produces garment hangers and lunch boxes, I. J. Poulin being president and treasurer, and G. S. Poulin, secretary; the Kellogg Manufacturing Company manufactures brushes, Langdon C. Kellogg being president, C. E. Kellogg, vice president, and I. J. Poulin, secretary; The Lamphrey Company, owned by Wm. H. and E. L. Lawrence, produces water arches; the Laughton Pad Company manufactures stamp pads; the H. J. Mullen Company, owned by Wilbur G. Cargill and Harvey J. Cleveland, produces paper tubes; the National Brush Company, Inc., manufactures brushes, H. P. Chandler being president, Gildo Di Berardino, vice president, and H. H. Smith, treasurer and secretary of the concern; the Palmer Milk Cap Company, owned by H. A. Palmer produces milk caps; the Purity Milk Cap Company, of which John E. Upson is president, A. C. Webster, vice president, and Joseph L. Dupray, secretary and treasurer, manufactures paper milk bottle caps; the Rice Gummer Products Company, Inc., of which Henry A. Palmer is president, and David M. Moseley, is secretary and treasurer, produces gummed sealing tape and adding machine rolls; the Standard Whip Company, of which Mrs. Mary Rickey is president, and Charles J. Rooney, treasurer, produces whips; the Steel Products Manufacturing Company, Fred W. Holmes, president, and E. S. Wright, secretary and treasurer, manufactures steel products; Tryco Products, Inc., of which Stanley S. Shepard is president and treasurer, and M. K. Shepard, clerk, produces brass plumbing spe-

cialties; the Tyler Whip Company, owned by George F. Tyler, manufactures whips and employs thirty hands; the H. M. Van Deusen Whip Company, owned by H. M. Van Deusen and E. T. Phelps, is also engaged in producing whips and employs sixty operatives; and the Westfield Grinding Wheel Company, of which George L. Gaylord is president and treasurer, and R. N. Gaylord, vice president and secretary, manufactures abrasives.

In 1929, the Vi-Food Company rented manufacturing space in the Westfield Power Building, and began the manufacture of food products, after experimenting with vitamins.

The Westfield Agitator Company leased manufacturing space the same year for the manufacture of an agitator for mixing paints, varnishes and glues.

The Springfield Agitator Company, producing a device for mixing paints and varnishes, which formerly carried on manufacturing in Springfield, now has its plant in Westfield. The company is owned by J. Robert Fish, of Westfield. The agitator is a propeller, governed by the same laws as those applying to a boat propeller and employed to keep liquids in continuous motion inside a drum or barrel. The container is made of steel, brass, duralumin or wood, as desired. An increased volume of business among contracting painters was reported in 1929.

In 1929, the Plainville Casting Company, producers of grey iron castings, erected a larger addition to its local plant, and the Standard Oil Company of New York, moved into a larger building the same year.

In 1927, the total number of manufacturing establishments in operation in Westfield was sixty-six. The total value of all products manufactured in these plants was $13,163,610, the value of stock and materials used in manufacturing was $5,378,354, and the difference between these amounts ($7,785,256) represents the *value added* by the various manufacturing processes. The average number of wage-earners employed in these establishments during that year was 2,971, and the total amount paid in wages was $3,802,933.

CHAPTER XXX

THE EXTENT OF THE MANUFACTURING CONCERNS OF THE TOWNS IN HAMPDEN COUNTY

A fairly good index of whether Hampden County is slipping industrially is obtained from the figures applying to the manufactures of that county, in 1831, compared with those of 1927, nearly one hundred years later. The total value of manufactured articles produced in all the industrial enterprises of that county, in 1831, was $2,191,000, and they were fabricated in sixteen cotton factories, containing 30,766 spindles and 712 looms, employing 4,099 workers; in paper mills, in which 39,324 reams of paper were made, and in plants manufacturing firearms, saddlery, harness, trunks, whips, woolen goods, and leather.

In 1927, the total value of manufactured articles produced in the 656 industrial enterprises of Hampden County was $320,585,051, these figures applying to 320 concerns in Springfield; 149 in Holyoke; sixty-six in Westfield; fifty in Chicopee; twenty-one in Palmer; twenty in West Springfield; five in Chester and twenty-five located in sixteen other towns in the county.

In 1801 the Agawam Distillery was established by E. Porter, to distill peppermint, and later whiskey made from potatoes was manufactured. Gin and malt from rye and corn, were produced, the distillery having a capacity of 312 gallons of gin a day.

About 1810, Thomas Belden, Amos Ambrose, and others, erected a cotton factory, in Agawam, yarn being spun and sent out to homes in the vicinity to be woven into cloth. It operated until 1825 and seven years later Messrs. Leonard and Parmenter built a mill where both cotton and woolen goods were produced, the company being removed to Palmer, while wall-paper superseded the textile fabrics, in the Agawam factory.

About 1812 Calvin and Justus Bedortha began the manufacture of broadcloth, but following the close of the war with England, business declined, and the firm went out of existence.

In 1872, the Worthy Paper Co., with capital of $100,000 established its plant in Agawam, the story of this concern being carried under the industries of West Springfield.

THE AGAWAM COMPANY

The Agawam Company has a background of considerable more than a century, the plant being located on the site of a custom fulling mill, which was established in 1812, to accommodate the farmers of that section, who brought their homespun cloth to the factory for the purpose of having it fulled into serviceable material for clothing. Later, custom carding was added, and, subsequently, looms were installed. Woolen cloth and stocking yarn were exchanged for the raw wool. Shortly before 1857, Newbury Norton and Asabel Sykes were the owners of the property, and, in May of that year, the Agawam Company was incorporated by them,

with Samuel Pyne, James Kirkham, Henry Kirkham, Roderick Ashby and Norman Norton, as the other stockholders. The mill was equipped with two small sets of woolen cards, and flannels, satinets, all wool indigo blue doeskin, and woolen yarn for home-knit stockings, were the products. When Civil War demands exceeded the local production facilities a mill was bought at South Hadley, where operations were also carried on.

Thomas Pyne early became identified with the company and was president and treasurer until his death in 1883. His brother, Samuel Pyne, then became president and agent, and Frederick A. Sykes, son of Ashbel Sykes, was the treasurer.

Upon the death of Samuel Pyne, in 1905, and of Frederick A. Sykes, in 1907, Frederick A. Worthington was chosen treasurer and agent of the company and still holds that position, having been connected with the concern for forty-two years. For many years the late James W. Kirkham, a prominent banker of Springfield, was the president.

In 1918, Mr. Kirkham and most of the stockholders sold their interests to A. B. Emery, A. G. Harris, and others. Mr. Emery was chosen president, and held the office until his death in 1928, when Mr. Harris succeeded him. F. D. Giles is vice president, and is in charge of the New York office.

The Agawam Company operates an up-to-date mill, with five sets of cards, eight mules, thirty-two looms, and all other machinery necessary to manufacture first class woolen goods and owns dwellings which house sixteen families. About seventy-five employees are carried on the payroll, and high grade cap cloths, and cloth for beach robes are produced.

THE INDUSTRIES OF BLANDFORD AND BRIMFIELD

In 1822 and in 1825 factories were built at Blandford where textile fabrics were produced and in 1832 a paper mill for the manufacture of wrapping paper was opened, the value of the product reaching $50,000 annually. At one period about the middle of the last century no less than seven tanneries were being operated in Blandford, turning out products valued at $38,000 a year. There were at least four woodworking plants in existence there at the same time.

Brimfield's manufacturing interests have never been extensive. In the early days grist and sawmills flourished, potash, saltpetre and tar were produced, and later pottery was made from clay obtained in Sherman's Pond. Brick making has continued to the present, as have saw and grist mills. Wool dressing and the manufacture of woolen hats, cotton production and shoemaking tools and machinery, boots and shoes, cabinetmaking and the tanning of leather have been included in the local category of commodities.

Brimfield's only industry of today is the brick manufacturing plant owned by Philias H. Provencal, which employs thirty operatives.

THE CORTLAND GRINDING WHEELS CORPORATION

A little more than a half century ago emery was discovered in the town of Chester, and the town found itself industrially for the first time. Previously it had been a sleepy village, but the development of the art of manufacture of grinding wheels, fashioned of emery, entitled it to the honor of being the cradle of the abrasive industry of America.

Emery mines were sunk in the nearby hills and mountains, and primi-

tive sheds grew into completely equipped factories, while the citizens of the little hamlet lived, talked, and dreamed of grinding wheels.

In the course of the years, the local supply of emery was exhausted, but the enterprise of the founders of the local industry, lost none of its zest, and other sources of supply, remote to be sure, were discovered. Corundum mines were developed in the Carolinas, from which sources the ore was shipped to Chester to be crushed, graded and fashioned into wheels, and when later on the supply of natural corundum was likewise exhausted trained chemists and engineers were called in to adapt various elements to the manufacture of wheels, and the electro-chemist undertook to duplicate the type of abrasive which mother earth no longer supplied.

The electric furnace was drawn upon and today, by definite control, during the process of manufacture, abrasives of differing crystalization, hardness and tenacity, are produced, to fill the exacting demands of the users of grinding wheels.

The first important abrasive to be fabricated in the electric furnace installed in the plant of The Cortland Grinding Wheels Corporation, of Chester, was a mixture of salt, sawdust, sand, and coke, in definite proportions and fused at a very high temperature, the product being one of the hardest known substances manufactured artificially.

Next experiments were carried on with bauxite clays in an attempt to secure an aluminous abrasive, and a hard crystalline material was produced, which on account of its uniformity is found to be superior to the corundums originally supplied from the mines of Chester.

The Cortland Grinding Wheels Corporation manufactures its wheels by four different processes—vitrified, silicate, shellac, and bakelite, the chief differences in each being in the bonding materials employed for fusion and the intensity of heat treatment.

The Chester concern has doubled its output during the last two years, by increasing its facilities, and in 1928 it added approximately 10,000 square feet of manufacturing space to its plant, and is contemplating further additions in 1930.

In 1929 the concern completed the installations of new equipment for the utilizing of the additions built the year before.

Additions to the establishment consist of an additional kiln 300 feet long and a new building for the humidity drying system, which accomplishes its purpose in a quarter of the time required by the old method of drying in the open air. New mixing and shaving machines and two new siding lathes were also added.

Automotive industries constitute the principal outlet and a large business is done with electrical concerns.

Its products are marketed largely in the middle west, and the company maintains offices in Chicago and Detroit. It is capitalized for $340,000 and employs 100 operatives. Charles G. Gardner is president, A. D. Robinson is vice president and general manager; P. M. Ayer is treasurer, Ralph S. Spooner, clerk, and C. B. Tilton, is works manager.

Today, Chester has three other prosperous and growing industries—the Chester Granite and Polishing Works, capitalized for $87,000, with its quarries located in the nearby towns of Otis, employing 150 hands, and turning out granite memorials, Richard Welin being president; K. V. Lander, treasurer and Oscar Nurmi, secretary: the Hamilton Emery & Corundum Co., capitalized for $200,000, employing thirty in the production of emery abrasives, F. L. Williams being president, and F. H. Jones,

treasurer; and the Chester Granite Quarries, Inc., capitalized for $125,000, employing 125 in the preparation of memorial tablets, W. A. Harder being president, and W. Sherman Harder, treasurer and secretary. Nestling between protecting hills, served by the New York Central lines, and with a low tax rate, Chester offers splendid opportunites for steady industrial growth.

As early as 1838 gold spectacles and gold and silver thimbles were manufactured in Longmeadow, by Dimond Chandler.

Since 1855 the Noble & Cooley Company has been engaged in the manufacture of drums and toys, at its plant in Granville, the native basswood and poplar being used in large quantities.

The concern is capitalized for $125,000 and employs from 80 to 100 operatives. R. B. Cooley is president and treasurer and R. G. Hiers, vice president and secretary, of this concern, now three quarters of a century old, which during all that long period has turned out hundreds of thousands of drums and toys to delight the youth of the land.

THE MANUFACTURES OF HAMPDEN, HOLLAND, EAST LONGMEADOW AND LUDLOW

The original sawmill in the town of Hampden, built in 1750, by Lewis Langdon, was followed by a grist mill erected by him at the time of the Revolution, and later by fulling and carding factories. Clover mills, potash factories, tanneries, and woolen mills were established later, and about 1858 Eleazer Scripter built the Hampden Woolen Mill, which became known as the Ravine Woolen Mill. In 1865 the Scantic Woolen Mill was erected, and fine cassimeres were produced there until 1875.

Paper manufacture was carried on at one time in Hampden.

About 1800 nail factories and iron forges were operated in the town of Holland, and powder was also produced there. About 1855 a cotton factory was established by Elbridge G. Fuller, which employed 50 hands until it was burned. Candle-wicking and cotton-batting were also manufactured in the town.

Since the destruction of an iron foundry by fire, in 1920, the town of East Longmeadow has had but one industry—the Longmeadow Quarry Co., engaged in quarrying brownstone from the famous Taylor deposit, near the center. Notable structures in every part of the United States boast of brownstone trimmings and foundations taken from the East Longmeadow quarry.

Rufus Calkins began the manufacture of chairs, at Ludlow, in the first years of the nineteenth century; a distillery was operated at Ludlow City at about that period, and in 1800 Abner Putnam commenced the production of scythes, and developed a large enterprise, while green bottles were made in a crude plant for a few years early in the last century.

THE LUDLOW MANUFACTURING ASSOCIATES

Few people are aware that next to cotton, there is no member of the prolific family of textile fibres that is more universally consumed than jute, which the dictionary tells us is "the glossy fibre of either of two East Indian tiliaceous plants."

Little idea of its importance in the manufacturing and commercial worlds is obtained from this laconic botanical explanation, and although the youngest textile material (having come into general use less than a

century ago), the consumption of jute far exceeds that of hemp, flax, silk and even wool.

What perhaps is still more significant is that in Massachusetts and in Chengail, near Calcutta, India, are industrial plants—the largest and most extensive of their kind in the world,—owned and operated by the Ludlow Manufacturing Associates and engaged in the manufacture from raw jute of fabrics of various sizes and weights, that are cut into bags and covers to protect raw cotton on its rail and water trips from the Southern fields to the textile centers; that encase coffee shipped from the tropical plantations of Brazil to Boston, the great coffee center of America; that are used by the cane planters all over the world because they constitute the strongest and most convenient container for their sugar on its journey to the refineries; that provide bags for the shipment of concrete, and, in short, that carry the world's materials.

While these are the primary uses of jute fabrics they are by no means the only sources of the employment of jute in world service. Some of the other forms bring the manufactured product closer to the general public of all nations.

It is spun into yarns for the foundation of carpets and rugs, while twisted jute yarns become twines, and in woven form they are used for the backing of linoleum, while as webbing they are employed in upholstering.

The development of the plant of the Ludlow Manufacturing Associates, at Ludlow, furnishes another outstanding example of the vision, tenacity, and business abilities of a group of Massachusetts entrepreneurs. Despite the handicap of high wages and consequent high costs, and of inadequate tariff protection on woven jute products, this concern has materially aided in making the United States the largest consumer of jute commodities among the nations of the world, 37.6 per cent of the average importations of jute and jute butts, amounting in the four years 1923-26 inclusive, to 71,300 long tons annually, having entered the port of Boston for the account of the Ludlow Manufacturing Associates, being shipped thence to the town of Ludlow—the seat of considerably more than a third of the domestic jute manufacturing industry.

THE GENESIS OF THE PRESENT-DAY COMPANY

In 1800, Wallamarump Falls—the name then given to a 40-foot drop on the Chicopee River, in Ludlow—were harnessed to operate a trip hammer in Abner Putnam's scythe shop, and twelve years later Benjamin Jenks, of Smithfield, R. I., formed a company, which built a wooden mill on the site of the present mill No. 1 of the Ludlow Manufacturing Associates, at what was then denominated at Jenksville, and where began the manufacture of cotton warps to be woven in the homes of nearby residents, with the woolen fillings made in the mill, this being in accordance with the general practice of the period.

In 1814, the Hampden Cotton Manufacturing Company was established in Ludlow. In 1821, the promoters of the Jenks enterprise organized the Springfield Manufacturing Company, and two years later, and again in 1826, they erected additional factory buildings of stone and installed looms for weaving sheeting. By 1833, the concern had prospered to an extent that warranted other mill structures, and of the 1,300 inhabitants in the town of Ludlow, 300 were employed in the plant, which at that period was converting 500,000 pounds of cotton into textile fabrics, with

the assistance of 10,000 spindles, flax and wool having been displaced by cotton. The yearly output was 1,600,000 yards of cloth, valued at $160,000, and the company had invested capital of $100,000.

In 1840, the concern launched into a new line of production and erected on the site of the present mill No. 8 of the Ludlow Manufacturing Associates a new building, in which gun barrels were forged under contract with the Federal government, the structure being used after 1846 for the manufacture of textile machinery. In 1848, the company failed, causing much distress to the people of Ludlow, many of whom lost some and others all of their savings.

The management of the enterprise passed to Messrs. Wood and Merritt, of New York City, who controlled it for eight years, during a portion of which time the stone buildings were leased to George H. Deane, who engaged in the manufacture of jute products—the first evidence that is found of jute being used as a raw material, in Ludlow. Upon the expiration of his lease, Deane bought the property at auction for $102,000 and formed the Ludlow Mills Company, which became a pioneer in the making of seamless bags. In 1868, the creditors of the company were forced to take over the assets, and they organized the Ludlow Manufacturing Company, with $200,000 capital.

It is a coincidence that in the year which witnessed the end of one phase of prosperity at Ludlow, an enterprise was conceived and launched in a distant part of the Commonwealth which was destined to take the place of the old Springfield Manufacturing Company, and to restore to the town its industrial importance.

In 1848, Charles T. Hubbard, of Boston, established the Boston Flax Mills, at East Braintree, which four years later was incorporated with $50,000 capital, and proved to be a prosperous venture in the manufacture of flax and hemp. The enterprise sought the skill and experience of trained operatives from Scotland and the north of Ireland, and one addition followed another until, by 1878, the plant, as a result of piecemeal construction, was found to be entirely unsuited to its requirements, and a complete rebuilding of the mill, or removal to another site, seemed essential.

THE ADVENT OF CHARLES T. HUBBARD

In the meantime, Mr. Hubbard had become treasurer of the Ludlow Manufacturing Company, and he conceived the plan of uniting the two enterprises, and of solving the problem which confronted him at East Braintree by removing the flax and hemp business to Ludlow where adequate power was available, with ample land at reasonable rates, and in 1878 the good-will and machinery of the Boston Flax Mills were sold to the Ludlow unit.

The three old mills and the former gun shop proving inadequate to accommodate the additional machinery, Mill No. 4 was erected, and cottages built for the operatives who followed the removal from East Braintree.

Then came an influx of French families from Canada and Northern New York State, with skilled workers from Dundee, Scotland, and Belfast, Ireland, and the Ludlow Manufacturing Company entered upon an enlarged line of products, including wet and dry spun carpet yarn, twine, webbing, gunny bagging, and union and linen crash.

Increased manufacturing facilities were required, and Mills Nos. 5 and

6 were built, the latter being completed in 1889, while the old stone mills inherited from the Springfield Manufacturing Co. were replaced by three new buildings, known as Mills, 1, 2 and 3, which adjoin and form what is denominated the Lower Mill group.

Enlarged water power facilities being required, a new site was purchased at Red Bridge, four miles up the Chicopee River, from Ludlow, where a dam was built, while the privilege was developed by the erection of a power-house, and the building of a transmission line to the plant. Direct connection of the company's railroad tracks with the irons of the Boston & Albany R. R. Co.'s main line on the opposite side of the river, was effected, at the end of the nineteenth century.

Mill No. 8 was completed in 1901, and the following year the business was transferred from the corporate form, under which it had carried on for 33 years, to the management of a board of nine trustees, operating under a declaration of trust and known as the Ludlow Manufacturing Associates.

In 1905 Mill No. 9 was erected, and the following year an annex to Mill No. 8 was constructed. Mill No. 10 was built in 1907, a second transmission line was installed from the Red Bridge powerhouse to the plant, and a fourth generator added to cope with the increasing load.

The founder and treasurer, C. T. Hubbard, died suddenly in 1887 and was succeeded by his son, Charles W. Hubbard, who retired in 1912 after completing twenty-five years service as treasurer, and thirty-five years' connection with the concern.

MALCOLM B. STONE CHOSEN TREASURER

Malcolm B. Stone, who had been assistant treasurer for two years, was named treasurer, and among the problems confronting him and his associates at that period was the question of additional mill facilities.

It was felt that the time had arrived for material extensions to be made, not only to meet the current demand for the products of the concern, but also to anticipate the future needs of customers and the construction of Mill No. 11 and of a large storage warehouse was begun in 1912, the buildings being occupied the following year. Mill No. 11 contains seven acres of floor space for manufacturing purposes, and, with the adjoining warehouse, provided an increase of over 40 per cent in the capacity of the plant. Up to this time all the raw material required at Ludlow had been bought through brokers, and the fallibility of jute standards, coupled with the dissatisfaction created by constant recourse to arbitration, which frequently resulted in awards that did not properly compensate the concern, constituted a serious handicap to the business, and the new management believed nothing short of complete control, in India, over the jute purchased, would solve the problem of securing a supply upon which the company could depend for the manufacture of its high-grade yarns. Two representatives were despatched to India to survey the primary market, with the result that Charles C. Colby was placed in charge of the Calcutta business of the concern, and a few years later only jute purchased through the office there was being used at Ludlow.

Then came the World War, and from 1914 until after the armistice tremendous difficulties were encountered by the management in addition to the general dislocation of prices and markets. The Associates were forced to cope with special problems of purchasing a raw material closely controlled at times by the Indian government, transporting it across

10,000 miles of water with all the attendant hazards that then affected ocean commerce, and paying for it when the fine mechanism of foreign exchange was all but shattered.

This latter factor was particularly acute in India, where the normal favorable balance of trade increased so enormously that only the importation of the precious metals, on the largest scale, could redress the situation.

Through direct representation in Calcutta, added benefits accrued to the Ludlow concern during this turbulent period, and it was able, through the Calcutta office, to dispose of shipments of bullion transmitted by the United States to be sold or exchanged for the necessary rupees. On one occasion, the Ludlow management purchased in this country a large quantity of silver, which was consigned to Calcutta, and there sold in the Bazaar at advantageous prices, the result of a rapid rise in the silver market. On several subsequent occasions gold was secured from the United States Mint, at San Francisco, for despatch to India, where it was disposed of to the Indian Government.

At periods, when cargo space was practically unobtainable—and then only at excessive costs—the Associates chartered steam and sailing vessels which, loading at Calcutta under the supervision of the concern's local office, were despatched usually via the Cape of Good Hope, to Boston. During the entire war period, when British losses grew to staggering proportions, the Associates were able to maintain a constant flow of raw materials, from India to Boston, and did not lose a single bale through the risks attendant upon ocean commerce. Anticipating the restoration of normal conditions, the management of the concern studied in 1915 and 1916 the possibilities of expansion, in India, and, in 1918, it definitely decided to erect a plant there, and selected the site for it the following year.

It is now a matter of history that even during the years just prior to 1914 a change was occurring in the character of industrial activities in the United States, and the experience of the Ludlow Manufacturing Associates illustrates the altered conditions. Until that period, the efforts of the management had been mainly directed toward keeping the enterprise in the van of that expassion which the rapid growth of this country was making possible, but subsequently, with the intensification of competition, the rigorous demands for higher standards of quality, and the evolution of the altered relations between management and labor, the task of the executives of the Ludlow concern was directed towards increased returns from the existing resources through the medium and scientific research and comprehensive study of the technique of manufacturing. Beginning about 1923, and continuing intensively through 1927 and 1928, the management at Ludlow entirely reequipped the plant with the most up-to-date and economical machinery known to the world for the manufacture of jute.

THE ASSOCIATES LAUNCH A POLICY OF EXPANSION

The post-war period also witnessed important developments in the corporate structure of the enterprise.

In 1921 the Ludlow Jute Company was organized to carry on the activities of the Associates in Calcutta, and in 1926 the Ludlow Sales Corporation was formed to sell the products manufactured at Ludlow and in India, the primary reason for this latter development being that the vol-

untary trust as a form of business organization, although common in Massachusetts, is infrequently found in other states of the Union where the concern carries on its business, and the management considered it more desirable to operate in the sales field under a form commonly known and understood.

In 1928 another subsidiary, the Ludlow-Georgia Bagging Company, was formed to operate a new plant in Savannah, Ga., which was acquired by the Associates from the South Eastern Manufacturing Company, and where cotton bagging for distribution in the southeastern states is manufactured.

Realizing that it would be wise policy further to diversify the products manufactured by the Associates by adding flax and hemp commodities to the line, this was accomplished in 1928 through the acquisition of the flax manufacturing business of the J. E. Barbour Company, of Paterson, N. J., and of the Smith & Dove Manufacturing Co., of Andover, in this state. The Barbour unit produces high grade linen threads and twines, the former being chiefly used in the manufacture of shoes, and included in this concern were the Allentown Spinning Company, of Allentown, Pa., important manufacturers of high-grade jute products, the business of the Sutherland & Edwards Co. of Paterson, N. J., also producers of jute products, and the National Net & Twine Co. with a plant at Moodus, Conn., manufacturing netting, principally for fishing purposes.

The Smith & Dove Manufacturing Company, whose history is treated under the industries of Andover, manufactures linen threads and twines. The acquisition of the Allentown Spinning Company made possible a wider distribution of jute products by Ludlow, and enabled the Associates to offer more dependable and quicker service to jute customers.

A company known as the J. E. Barbour-Allentown Corporation, all the stock of which is owned by the Ludlow Manufacturing Associates, was organized under the laws of this state to own and operate the group of companies acquired from Mr. Barbour, who became vice president of the new concern, Malcolm B. Stone being the president, C. S. Colby and George Endicott, the other vice presidents; Everett F. Gray, treasurer, and C. S. Colby, secretary.

The output of the recently acquired plants is sold by the Ludlow Sales Corporation, and the average sales of the new divisions were in excess of $6,000,000 annually at the time they were purchased.

THE NEW UNIT IN CHENGAIL, INDIA

The company's plant in India, near the village of Chengail, fourteen miles downstream from Calcutta, and on the banks of the Hooghly River, stretches for three-quarters of a mile along the water, and following the two years of continuous construction there was reared on an inconspicuous strip of agricultural land an industrial center which affords employment, shelter, water, light, and all the related facilities, to the majority of the eight thousand employees and their dependents.

Here in far-off India, Massachusetts industrialists have created a self-contained community, and, although Salem ships no longer crowd the moorings along the Hooghly, as they did in the days of yore, the plant built on its banks by this Bay State company serves to revive in another sphere the traditional interest of this Commonwealth in India, and furnishes ocular evidence that the spirit of adventure and daring that once

made possible her vast Eastern commerce remains a living, pulsating entity.

Embraced in the layout are nearly one hundred buildings, including mills, sorting sheds, staff residences, Coolie Lines, modern highways, railroad tracks, and enormous reservoirs in which water is stored during the dry season.

All the finished products and the baled jute for the plant at Ludlow are shipped by water down the Hooghly to the ocean-going vessels, at the port of Calcutta. Mill No. 1 at Chengail has a floor area of 69,600 square feet and is used for the manufacture of cotton bagging. Mill No. 2 has 189,225 square feet of floor area, and is used in the making of Hessians, while Mill No. 3, which is one of the same size as No. 2, manufactures sackings and bags made from this material.

Three turbo-alternators, with a total capacity of 4,500 kilowatts, supplied with steam by eight boilers, and of American manufacture, comprise the present equipment of the Chengail powerhouse.

The Coolie Lines, constructed of concrete, shelter 5,000 persons, and are equipped with filtered water for drinking and bathing purposes, and non-filtered water for flushing the concrete streets, which is done regularly twice a day. A hospital and dispensary, educational facilities for the children of the mill operatives and a community house and tennis courts for the staff of Americans, are some of the activities fostered by the company.

THE IMPORTANT RESEARCH WORK

The Ludlow Manufacturing Associates were among the pioneers in establishing a research department, the executives appreciating that constant vigilance, even balance and steady development were required to keep in advance of the industrial procession. The scientific investigations carried on in this department provide the mainsprings of the prosperity which the enterprise enjoys.

In this complicated and intricate workshop, where the ideas advanced by the management are studied, analyzed, tested and brought to fruition, the combined efforts of mechanical engineers, chemists, and bacteriologists are steadfastly devoted not alone to the further development of existing practices, but to an intensive study of the composition of jute, its relation to varied treatment, and its adaptation to methods of handling not undertaken hitherto by the jute industry.

The testing work is carried on principally in quarters specially designed for it, because, in arriving at an accurate determination of the properties of any material for comparative purposes, the first essential is that the conditions of the test shall be identical for all specimens. At Ludlow, this requirement is fulfilled with an exactness superior even to that attained by the Bureau of Standards, at Washington. All tests and experimental work on fibre are carried on in a room in which the temperature and degrees of moisture are kept constant, and the forces essential to conduct the tests are applied by machines in such a way that variations due to the human element are almost completely eliminated. The room is maintained at a temperature between 68 and 70 degrees Fahrenheit and at 65 per cent relative humidity, and in order that its condition may be standard all material to be tested is brought in and allowed to remain for forty-eight hours before any experiments are undertaken. At Washington, the Bureau of Standards controls temperature and humidity for only a part of the day.

In the employee relations the Associates have made it their universal policy to avoid any trace of that paternalism with which industrial managements were so often charged twenty-five years ago. The operation of the Stevens Memorial Building and its attendant facilities, of the hospital, and of the golf course are examples of this policy in operation. In 1913 the Associates established a non-contributory pension plan for the employees, providing for optional retirement of employees who had been in the service of the concern for twenty years or more, and who had reached the ages of 65 for men, and 55 for women, with compulsory retirement at 75 and 65, respectively.

The Ludlow Mills of the company are devoted to the manufacture of five main groups of products—yarn, fine twines, coarse twines, cotton bagging and webbing, in all of which jute is the raw material, with the exception of some fine twines and wet spun yarns which employ a certain quantity of hemp.

In 1916, Harley W. Morrill became manufacturing agent at the Ludlow plant, where 3,000 employees are carried on the payroll. He served until his resignation in 1929. In all the units now operated by the Ludlow Manufacturing Associates, more than 10,000 men and women are employed. There have been relatively few changes in the personnel of the principal executive offices during the sixty odd years of the life of the concern, the treasurer's chair having had but three occupants, the selling agent's the same, and the manufacturing agent's but four, including the present officers in each instance, while the more recently formed foreign department is still headed by its first manager, Charles S. Colby.

Since 1923 the several purchases, plus the additions to plant and machinery, have involved expenditures of nearly $6,000,000 in cash, and the issuance of 46,400 shares of stock, at $140 per share, or a total of cash and stock of $12,500,000. With its new units, Ludlow consumes approximately 350,000 bales of jute annually, while it also produces between 25 and 30 per cent of the country's linen thread business. Large amounts are being expended on the recently acquired plants in improving their efficiency.

The criterion of the success of any industry is, in essence, its possession of the ability to supply a genuine world-need economically.

Judged by this standard, the jute industry is outstanding because of the wonderful development made over three score years by the Ludlow Manufacturing Associates, whose activities perhaps more than those of any other world unit have gained for this comparatively little-known fibre an important place in the commerce of the globe. The ramifications of this concern, planted at Ludlow more than sixty years ago, have extended half around the world, have fashioned an agricultural commodity into unique and marketable commodities, have advanced the fibre from its Oriental atmosphere to one possessing an Occidental flavor, and have developed its manufacture in both the Old World and the New, and throughout this period the constant aim of the Associates has been the attainments of high standards of quality, efficiency, and the well-being of those identified with its manufacture—the triple hallmark of industrial operation.

The Birnie Sand & Gravel Co., with preferred capital of $40,000 and common stock of $110,000, is engaged in the marketing of sand and gravel, at Ludlow, A. C. Birnie being president and general manager;

H. M. Parsons, treasurer, and A. H. Rathbun, secretary, of the corporation.

THE INDUSTRIES OF MONSON

The Chicopee River and Twelve Mile Brook, in Monson, early became studded with saw, grist, cotton and woolen mills, while iron, axe, linseed oil, lead pipe, optical, tanning, and silk worm industries were established in later years.

The granite quarries of Monson were first opened by the United States Government about 1809 to obtain stone for the Federal Armory, at Springfield, and after seventy-five years they came into the possession of Rufus Flynt, and the corporation in which he was interested during his lifetime employed 500 men in its local quarrying operations in 1900. At one period a stone was taken out at the quarry which measured 354 feet in length, 11 feet in width and 4 feet in thickness.

The Monson Woolen Manufacturing Company was established in 1813 and the Hampden Cotton Manufacturing Company came into existence the same year. In 1820 the Rockbottom Cotton Factory was built and in 1829 the original Ellis Mills were erected and were burned ten years later.

On the June day, in 1837, that Victoria was proclaimed Queen of England, the frame was raised on the oldest unit of the present-day plant of the Monson Worsted Rayon Co., Inc., of Monson, Joseph L. Reynolds being the original owner of the factory now almost 100 years old, and which has stood the vicissitudes of time and the many recurring changes in management and types of production. The firm of Reynolds, Holmes & Co. succeeded Joseph L. Reynolds as owners and occupants. Then came the Hampden County Manufacturing Company, C. W. Holmes & Sons, Holmes & Ellis, S. F. Cushman & Sons, Joseph H. Loudon, the Somerset Woolen Company, the Grant S. Kelley Woolen Mills, Inc., and Thomas J. Corcoran, and under these various owners the products have included satinets, fine cashmeres and worsteds for men's wear.

The present owners, who acquired the property in 1927, have installed new machinery for dyeing, weaving and finishing and are engaged in making goods for women's wear and between 150 and 200 hands are employed. Henry M. Converse, of Palmer, is treasurer.

A straw and felt goods factory was built in 1838 by Charles H. Merrick and Ropes Fay, and was a happy combination of seasonal products —straw hats being manufactured in the winter seasons and felt headgear in the summer months. As late as the eighties the manufacture of straw hats was a leading industry in Monson.

In 1927, the Heiman & Lichten Manufacturing Company, which was then operating the mill, closed the doors of the ninety-years-old factory, but this industrial loss was made up by a large $95,000 extension made that year to the plant of the A. D. Ellis Mills, Inc., which included a new weave shed, 80 by 50 feet, and an addition to the main manufacturing building, 100 by 40 feet, two stories in height, affording opportunity for the employment of more workers than were lost as a result of the withdrawal of the other enterprise. The Ellis concern established in 1870 and incorporated in 1923, manufacturing automobile, billiard and casket cloth of the finest quality, is an outstanding example of a successful Massachusetts textile industry, having operated day and night forces for many years past. Capitalized for $600,000, the concern employs upward

of 475 operatives. Dwight W. Ellis is president and treasurer; George W. Ellis, vice president and assistant treasurer, and Frank J. Entwistle, secretary.

Ricketts & Shaw, engaged in the production of woolen suitings, for uniform purposes, is one of the stable and valuable local industries, having had a successful career for 20 years. The concern employs upwards of 100 hands and is owned by William L., and Charles L. Ricketts. It was in 1909 that these two brothers established the Ricketts & Shaw Mills, William L. Ricketts having previously been identified with the Ellis-Ricketts & Co. Woolen Mills. The Ricketts concern is a six-set mill, with eight card sets.

THE MANUFACTURES OF PALMER

Following the introduction of sawmills in Palmer as early as 1730 and the grist mills, which began to appear about 1736, a wool carding and cloth mill was built by B. S. Cummings about 1790, and a fulling mill five years later. A tannery was established on the Ware River, as early as 1766, and another in Blanchardville, in 1790.

In 1825, the dam at Three Rivers was built, and soon after the Three Rivers Manufacturing Company built a mill, but the concern failing, the Palmer Manufacturing Company took it over in October, 1831. The factory was burned in 1863 and rebuilt ten years later. The old designation of the village comes from the fact that it is at this point that the waters of the Ware, Swift and Quaboag rivers form the Chicopee River. The Otis Company followed the advent of the Palmer Manufacturing Company in the use of the splendid water power at Three Rivers.

At Thorndike, following the erection of the original grist mill, in 1736, a sawmill was built soon afterwards, which operated until 1795. Two years later a grist and sawmill was erected there, and when Capt. Charles Cargill bought it in 1797 he added a clothier's mill.

Josiah Leland made the first axe handle produced by machinery, in Thorndike, about 1825. In 1836 the Thorndike Company was formed and the lower stone mill was built the next year, and the upper stone plant was erected in 1846-47, the production of cotton goods having been carried on continuously for nearly 100 years.

As early as 1879, 3,000 bales of cotton were used, 5,500,000 yards of cotton ticks, denims and stripes were produced, and 400 operatives were employed in the two mills.

James and Samuel Lamont were the first to utilize the water power at Bondsville, when they erected their grist mill, in 1749. In 1795 Messrs. Darling & Boyden built a sawmill there. In 1844 the Boston Duck Company was formed, and the Bondsville mill was completed four years later, 15,000 spindles being installed, and 400 operatives being employed. As early as 1877 the concern used 2,800,000 pounds of cotton. In 1876, the Bondsville Bleaching & Dye Works were located in the village.

In 1926, the Otis Company, of Ware, purchased the plants and assets of the Boston Duck Company, and of the Bondsville Bleaching & Dye Works, and now operates these units as a part of its activities, together with the Palmer Mill, thus making three plants in the town of Palmer that are owned and carried on by the Otis Company. The Duck Mills employ 550 operatives.

The important water power on the Quaboag River, at Blanchardville, was first utilized by Solomon Slater, who removed to Palmer, from Rhode

Island, about 1790, and built a mill which he fitted with machinery of his own invention. He remained there but a fe wyears, and the plant was later used as a grist mill. In 1805, Capt. David Hyde operated both grist and sawmills there, which passed to Elisha Converse in 1818, and to Rufus Bugbee, in 1830.

In 1824, Maj. John B. Blanchard began the manufacture of scythes, in Blanchardville, continuing the business until 1840, when he was succeeded by his sons, who added other products. The water power at that point later passed into the hands of the Central Mass. Electric Company.

INDUSTRIAL PIONEERING STILL GOING ON

The spirit of industrial pioneering is still alive in Massachusetts, pessimistic opinions to the contrary. New industries are coming into being every week to help maintain the prestige of local inventive genius. The recently incorporated concern, known as Jarvis & Jarvis, of Palmer affords an excellent example of the constant industrial growth that is taking place in this section of the United States. The original capital of the concern consisted for the most part of high ambitions, untiring energy and sterling integrity—assets that have made Massachusetts great industrially—and as an infant the unit experienced all of the customary discouragements attendant upon offering a new product to an old market. When profits began to accrue they were ploughed into new and improved machinery, and ultimately a new and modern concrete factory building was erected. Success came to the firm because of its ability to adopt specialization and to supply needs which the energetic promoters were quick to sense, as well as by proceeding upon the theory that no matter how good a product may be, it can always be bettered.

Manufacturing rubber-tired service trucks and rubber-tired wheels and casters sold throughout the United States and foreign countries to hotels, hospitals and industrial plants, the firm has been obliged to frequently increase its facilities for production in order to keep pace with incoming orders.

N. L. Jarvis, in speaking of the possible advantage of doing a national business in a Massachusetts plant, outlines the true situation in these words:

"Every location has its own particular advantages and disadvantages. We can point to both in our own business. But I believe that location is of minor importance if you have a product that supplies a definite demand, and if your product is better than can be secured elsewhere. Price, of course, is a big factor, especially on first orders. But replacement orders are rarely governed by price or freight rates—they go wherever the best is obtainable. We receive just as good a percentage of business from the West as we do from the East. I think the talk about New England's industrial leadership slipping should not be taken too seriously. The serious thing to consider is the possible letdown of New England initiative. There is more to be feared from dry rot than from Southern or Western competition." The partnership is made up of Nelson L. and Frank J. Jarvis.

In 1905, Andrew B. and James Rathbone began the manufacture of pinion wire and special cold-drawn shapes in a barn in the rear of the latter's home, but the business prospered from the start, and an old broom factory was purchased and occupied. Later the expansion was such that a concrete factory, 300 by 80 feet, was erected, and in 1918 two other

brothers, Thomas P. and Fred P. Rathbone, entered the firm of A. B. & J. Rathbone.

The products are used in clocks, typewriters, motion picture machines, automobiles, firearms, and automatic machinery.

In December, 1907, the New England Metal Culvert Co., was incorporated and began the manufacture and sale of Armco corrugated culverts the following spring, the concern being the pioneer in this territory in the introduction of the product. Operations were continued in the three southern New England states until March, 1925, when the North East Metal Culvert Company, of Nashua, N. H., was merged in the New England Metal Culvert Company. Since the merger the latter concern has built another factory in Portland, Me., and in June, 1928, it opened a branch factory at 10 Alger Street, Boston, where it erected a building designed for its purpose. The main plant and office are at Palmer.

Burton S. De Frees is president; F. J. Hillman and Paul D. Sargent, vice presidents, A. B. Rathbone, clerk, and Theodore Norman, treasurer.

BETTER BRUSHES, INC.

On December 15, 1919, there was formed Better Brushes, Inc., a concern which selected Palmer as the location for its home office and factory because of the unusual shipping facilities. A plant where wagon manufacture was carried on was bought, and brush machinery was installed. Early in 1920 R. K. Metcalf sold the first Better Brush in a home across the street from the factory, and in the intervening years over 40 branch offices have been opened, while over 500 representativs call at upwards of 10,000 homes each day.

At the outset the company adopted the policy that all sales executive positions should be filled from the ranks, and from the director of sales down through the Sales Promotion Manager and Assistant Branch Manager all started selling brushes and worked their way up through merit, thus giving every man who comes into the organization assurance that his success or failure depends solely on himself, and that if he has the ability it is bound to be discovered and properly rewarded.

Since the original factory was bought a three-story brick administration building and residences for employees have been built and a ten acre plot, adjacent to the B. & A. tracks, has been purchased upon which the company plans to erect a modern, sanitary brush factory in the not distant future.

All the common stock is held by employees which gives them a vital interest in the success of the concern, and which accounts for high efficiency in production, marketing and supervision. The company has never failed to pay its regular dividends since it began business.

Stanley L. Metcalf, the president and director of sales, is a native of Canada, where he was born on a farm. During his course of study at Springfield College, he was a telephone operator, scrubbed floors, worked on a farm, waited on table in a restaurant and refereed football games, finally serving as general agent for the Fuller Brush Company, and selling brushes part time in college and full time in summer. Following his graduation, he opened a branch office for that company in Boston, became sales manager and later a director, secretary of the concern, vice president and director of sales and advertising, resigning, in 1919, to become president of Better Brushes, Inc.

Charles H. Line, the vice president, treasurer, and general manager

of the concern, was born with a penchant for salesmanship, and entered Springfield College with $11.07 in his pocket, and a sample of aluminum cooking utensils in his hand. He sold aluminum products nights, Saturdays, and during the summer vacation, and upon graduation had paid all his college expenses and had $100 in the bank. He, like Mr. Metcalf, became a brush salesman, and rose step by step until he became advertising manager for the Fuller Brush Company in 1919, resigning the position to become Treasurer and Purchasing Agent of Better Brushes, Inc., in December of that year, and in 1923, he was promoted to his present position.

James W. Payne, secretary and factory superintendent; Leslie A. Carpenter, the assistant treasurer and controller, and George H. Weir, shipping manager, constitute, with Messrs. Metcalf and Line, the board of directors.

In 1927 the concern changed its plan of operation with its agents from what was termed the C. O. D. policy to the personal delivery plan, with the result that in 1928 the company had its best year since 1923.

OTHER MANUFACTURING UNITS OF PALMER

In 1927, The S. C. S. Box Company, Inc., purchased one of the buildings of the Thorndike Mills, and transferred the machinery then in use at its factory, in Willimantic, Conn., to the new unit at Thorndike, where it quickly reached capacity production. James W. Colgan is president and treasurer, H. S. Ormsby, secretary, and F. H. Sherman, vice president. The corporation has capital of $50,000 and employs 130 operatives.

The Washburn Chair Company acquired the Dean & Sherk plant in Palmer in 1928, and equipped it with machinery for the production of chairs and baby carriages, employing twenty-five men at the start, and later increasing the force to seventy-five. The unit is operated as a branch of the main factory of the concern at Warren, and is owned by E. P. Washburn.

W. W. Converse & Co., owned by Mrs. Clara L. Converse, carries on the manufacture of polishes; the T. D. Potter Estate, of which Charles S. Potter is proprietor, is engaged in the production of builder's finish at Bondsville, under the management of Frank E. Albro, the unit having been established in 1862 by the late T. D. Potter; one of the plants of the M. J. Whittall Associates of Worcester, is located in the town, operating under the name of the Palmer Carpet Mill, and a branch plant of the Wickwire-Spencer Steel Company, is one of Palmer's large industries, being engaged in manufacturing wire, cable wire, and wire products.

The carpet plant is one of the town's oldest manufacturing units, having been engaged as far back as the Civil War period in manufacturing army blankets for the Federal Government. In 1891 it was acquired by the Whittall Associates and has been operated by that group since that time, many enlargements and improvements having been made in recent years.

THE WESTFIELD RIVER PAPER COMPANY

Another twentieth century enterprise to the credit of Hampden County is the Westfield River Paper Company of Russell, which was incorporated in June, 1916, with authorized capital of $1,000,000, only a part of which has been issued. The new concern purchased the plant and equipment

of the former Russell Falls Paper Company, the latter including a 96-inch Fourdrinier machine, 57 and 46-inch calender machines, a cutter, four rewinders, a trimming knife, and an electrical unit with a capacity of 325 kilowatts.

The company has since added a 57-inch calender, a new rewinder and cutter and three embossing machines, as well as a new 500 kilowatt steam turbine, and a new electrical unit which increases the total to 725 kilowatts, thus enabling the concern to increase its production approximately 50 per cent over what it was during the first year of operation.

Additional real estate has been purchased, and several houses have been erected for the company's employees.

Glassine paper, both plain and embossed, is produced, the latter type being manufactured in sixteen different designs. Approximately one hundred operatives are employed. Alfred Leeds is president; P. F. Moore, vice president, and J. J. Costello, treasurer and secretary.

The story of the Strathmore Paper Company, which operates a plant at Woronoco, in Russell, is told in the resume of the industries of West Springfield, which appears in this chapter.

A gun powder mill was established in Southwick in 1805, which made 200,000 pounds of powder annually.

From 1830 to 1842 boots and shoes were manufactured in Wales, 6,000 pairs of the former and 9,000 pairs of the latter being produced in 1837, while in 1855, 225 pairs of boots and 33,000 pairs of shoes were made in the town.

In 1847 Hamlin G. Dunham began the manufacture of cotton batting, followed by candle-wicking.

Then followed the Wales Manufacturing Company and the Shaw Manufacturing Company, both engaged in the production of woolen goods, and the building of the Dell Mill, the largest factory in the town, which, in 1880, afforded employment to sixty hands in the manufacture of woolen cassimeres.

The Heagan Mill, the Valley Mill, and the Eden Shaw Mill, were of later date, but all three have ceased operations under their original names.

In 1929, an idle plant in the town of Wales, built in 1865, was reopened by the Clairmont Woolen Company, of which William Muir is president and secretary, C. V. Muir, treasurer, and Joseph Clairmont, vice president. The plant, equipped with twenty-three looms, was improved by the addition of new machinery, and the corporation has capital of $500,000 and employs 100 operatives.

THE IMPORTANCE OF INDUSTRIAL WEST SPRINGFIELD

The industries of West Springfield are closely allied with those of the sister city across the Connecticut, and although twenty or more plants are located in the township of West Springfield, many of them are regarded as integral parts of Springfield's industrial life.

The grist and sawmill early established by Messrs. Baggs, Ashley and White; the important tanneries, at Ashleyville; a hat factory, carried on by Lester Williams, as late as 1840; a mill for cloth dressing, and an extensive gin and brandy distillery, all preceded the modern development.

On what properly is the Agawam part of the Westfield River, but which is commonly referred to as Agawam River, almost one and a half miles from the Connecticut, is a busy locality, known as Mittineague.

In 1840 a substantial dam was thrown across the stream and eight

years later the Agawam Canal Company, capitalized for $377,000, built an extensive cotton mill which employed 300 hands, and from that time on the Mittineague section has hummed with the wheels of industry.

About the middle of the nineteenth century the Clark Carriage and Wagon shops did a large business, and a concern engaged in the manufacture of cement-lined cast-iron pipe used by water companies, flourished at that period.

The intervening years have seen one unit after another added until today the locality is an industrial city in itself with one plant of the American Writing Paper Company—the Agawam Paper Company, built in 1859—situated there, which turned out in its earlier years a ton and a half of fine grade writing paper daily; the Southworth Company, manufacturing bond and ledger papers; one of the plants of the Strathmore Paper Company, engaged in the production of the highest grades of fine writing paper; the Wico Electric Company, manufacturing magnetos and storage batteries; the Worthy Paper Associates, producing high-grade writing papers; the Springfield Glazed Paper Company, manufacturing surface-coated and other papers; the Perkins Machine & Gear Co., producers of gears; the Cogswell Manufacturing Company, specialty manufacturers; the General Fibre Box Company, manufacturing corrugated and fibre shipping cases, and many other concerns.

In 1874, Col. John F. Marsh removed from Nashua, N. H., to Springfield and established the Springfield Glazed Paper Company, with $100,000 capital. Late in 1882, the Lyman Street plant was destroyed by fire and soon after he purchased the site of the present plant in West Springfield and erected the main portion of the building as it now stands. From time to time additions were made and today the mill is a familiar sight to the thousands who cross Memorial Bridge. The company manufactures surface-coated papers and has developed new lines such as fancy papers which are used for envelope linings, fancy boxes, wrappers and other purposes.

Today, the concern has capital of $200,000, and employs seventy-five operatives. W. H. Shuart is president and treasurer; Irving J. Shuart, vice president; John D. Shuart, assistant treasurer, and Karl R. Hammond, clerk.

THE GENIUS OF WEST SPRINGFIELD AND RUSSELL—HORACE A. MOSES

It was indeed a happy and fortunate circumstance for Hampden County and the Commonwealth of Massachusetts, when, in 1892, Horace A. Moses, then superintendent of the Agawam Paper Company, of Mittineague, decided to capitalize his energy, resources, long experience in the manufacture of paper, and his indomitable spirit, by organizing the Mittineague Paper Company. He had begun his career as shipping clerk of the Agawam unit, at the age of 22 years.

The concern, which now operates plants at Mittineague and Woronoco, had its beginning on the 17th day of March, 1892, and turned out its first paper on the nineteenth day of the following December.

The new company prospered from the start, largely because it chose to be a leader rather than a follower in the field of fine paper manufacturing, and the concern, in addition to making bonds, ledgers and other standard grades of high quality, began the development of a line of specialties such as rag book papers, drawing and artists' papers and boards, and deckle edge cover and writing papers of wide variety.

Additions were made to the original plant and a second machine was installed. Next an entire mill was erected adjacent to the original unit and a third machine was added to the equipment.

A few years later, Mr. Moses, with the restless energy so characteristic of him, acquired a controlling interest in the Woronoco Paper Company, a two-machine mill, located on the Westfield River, at Woronoco.

Illustrating the growth of the concern it is pertinent to point out that in 1893, the first full calendar year of production, it manufacured 550,994 pounds of paper. Seven years later, or in the year 1900, its production had risen to 2,000,000. In 1927, its total production was 26,000,000 pounds, thus indicating that it averaged nearly a million pounds increase each year during the first 27 years of the present century.

In 1911, the Mittineague Paper Company and the Woronoco Paper Company were merged into one corporation—the Strathmore Paper Company, taking its name from the famous trade-mark "Strathmore Quality," which had been used by the Mittineague Paper Company for many years.

Soon the expanding business of the company necessitated additional capacity, and, after a thorough study of modern paper-making practice in this country and abroad a second mill was built at Woronoco, in 1913, which represents the last word in facilities for making high-grade paper. When the Strathmore Paper Company was formed the one paper-making machine in the old Mittineague Paper Company's plant had a capacity of twelve tons of paper per week. The present normal production of all the Strathmore machines is 275 tons a week, and all this in less than 40 years.

With the erection of the second plant, at Woronoco, came the problem of caring for the employees who would be brought to Woronoco to operate it. A building plan, based upon the necessities, desires and income of the workers was worked out. Attractive homes were built, equipped with modern conveniences, and so located as to retain, insofar as possible, the natural beauty of "STRATHMORE TOWN."

For the unmarried who lacked homes of their own, Strathmore Inn was provided. Here, also, the traveler may stop for rest and refreshment.

Today, almost every family in Woronoco owns an automobile and over one hundred garages, built mostly on the community plan, have been erected.

A community building was erected in 1920 as a memorial to the Strathmore boys who gave their lives in the World War, and this structure serves the social and spiritual needs of Woronoco. Two additional units provide clubrooms for men, women, boys and girls, and a gymnasium for athletics, dancing and other recreational activities.

Strathmore Park, an athletic field and auto camp ground in a beautiful natural setting among the foothills of the Berkshires on the winding Westfield River, affords facilities for baseball, horseshoe pitching and other athletic sports and for steak roasts, clam bakes, and outings of all kinds. The park provides a place for the guests of Strathmore to stop overnight, pitch their tents and dwell close to nature, with, however, the comforts and conveniences which the wayfarer appreciates and enjoys.

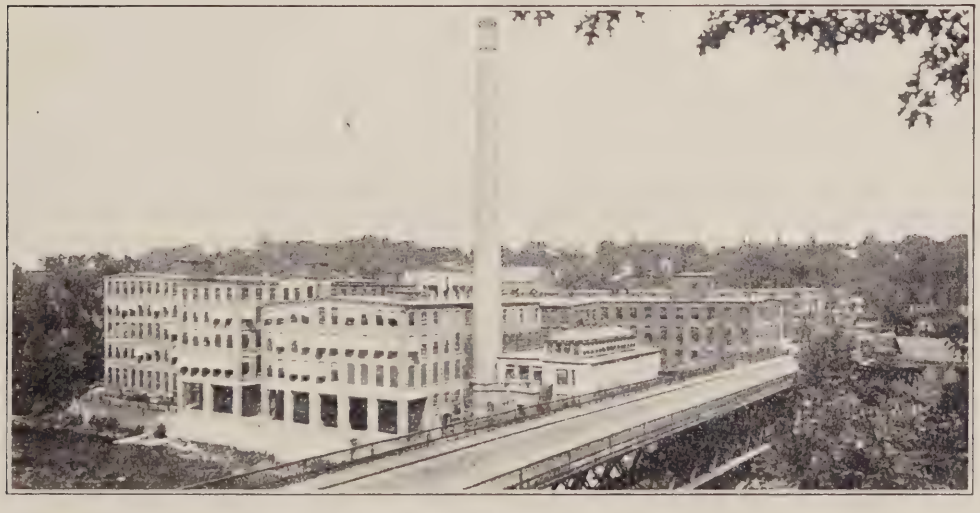
Nearby Strathmore Park are the grounds and clubhouse of the Woronoco Rod and Gun Club, where trap shooting is practiced by enthusiasts. Strathmoreans working in the Mittineague Mills do not reside in a Strathmore Town, but they are privileged to enjoy the new community Y. M.



STRATHMORE PAPER COMPANY
Mill No. 1 at Woronoco



STRATHMORE PAPER COMPANY
Mill No. 2 at Woronoco



STRATHMORE PAPER COMPANY
Mills Nos. 1 and 2 at Mittineague

C. A. building, which has been provided in Mittineague. This truthfully may be said to be one of the finest of its kind in the country. Built with the underlying thought of serving the entire family, it offers to the fathers, mothers, sons, and daughters of West Springfield facilities for recreation and physical, mental, and spiritual growth. Its erection was made possible by Strathmore and its officers, in coöperation with other mills and the citizens of the community.

Strathmore employees are for the most part members of the Strathmore Beneficial Association which provides life insurance, sick benefits, and an annual physical examination by the Life Extension Institute, as well as other advantages for the maintenance of good health.

By means of an educational plan, many employees attend schools, including Northeastern University in Springfield, where the degrees of Bachelor of Law and Bachelor of Commercial Science may be obtained. Others study correspondence courses in various subjects, chief among which is the manufacture of pulp and paper, thus fitting themselves to be of greater worth to the company and, in return, to receive greater rewards. The company pays the tuition and collects weekly or monthly from the student a small amount until the entire sum is returned, and if the course is successfully completed the entire cost is refunded. In aiding the Beneficial Association and other activities, it is the policy of the company to contribute dollar for dollar with the employees rather than to give outright the entire amount, paternalism having no place in the Strathmore plan.

All Strathmore men and women of over three years' service receive annual vacations with pay, some one week, others of longer service, two weeks. Many take advantage of this plan, as labor turnover at Strathmore is remarkably low. Service pins, awarded by the president at his annual dinner to Strathmoreans on the completion of twenty-five year's service, are worn by thirty-seven men and women. The number who can boast ten, fifteen or twenty years of service, is large.

Besides the officers, nearly all department heads and many other Strathmoreans are stockholders in the company. They hold either employees' preferred stock or common stock, or both. Employees' stock carries service dividends based upon length of employment, in addition to the regular seven per cent dividend.

All of the directors, with one exception, are active in the management of the business, consequently there is no absentee controlling ownership.

Within the short space of two score years the word "Strathmore" has become the synonym for all that represents quality in the paper trade, and perhaps it may truthfully be said that the products of the Strathmore Paper Company are more varied than those of any other unit in the world, since it manufactures bond, writing, book, cover, box cover, photo mount, blue print, lampshade, artist, chart, check, wedding, bristol, greeting card, and papeterie papers of all kinds.

For twenty-five years Strathmore has followed a consistent national advertising policy, until its trade name is known in every civilized country on the globe, and the distribution of its products is made all over the world.

The purchase in 1928 of the B. D. Rising Paper Company, of Housatonic, added 25 per cent or more to the volume of Strathmore production. The Rising unit continues the lines, brands and trade relations which characterized its past operations, and with ledger papers, which the

Strathmore units had not made, thus diversify the merged company's products. The same year a large stock interest was taken by the concern in the Old Colony Envelope Company, of Westfield.

Every year sees more or less extensive betterments in the buildings and grounds of the company at Mittineague and Woronoco. In 1928, besides improvements in machinery, considerable work was done on the canal at Mittineague, and along with the erection of a new community building at Woronoco, costing $100,000, the grounds about the mills are being further improved. At Mittineague, the removal of the old Agawam No. 1 mill on the land purchased from the American Writing Paper Company was a step toward the better landscaping of the properties.

In 1929, a modern printing plant to handle the company's advertising work was erected on the site of the old Agawam Mill No. 1.

Horace A. Moses has been president of the Strathmore Paper Company from the start; Col. B. A. Franklin is vice president, George E. Williamson is treasurer, and F. N. Bridgham and A. E. Shattuck are assistant treasurers. George R. Wholean is chief engineer of the company, and C. M. Bryan is general superintendent.

Officers of the new Rising Paper Company include, as president, Walter J. Raybold, who held this post with the former unit; Colonel Franklin as vice president, and Mr. Moses as treasurer; William F. Dewey, as superintendent.

Thirty-five years after Mr. Moses started business for himself, the Strathmore Paper Company purchased the two mills and other properties of the old Agawam Paper Company in Mittineague, where the founder learned paper-making. The question is often asked whether, in his early days in the old mill, he ever dreamed of such a possibility.

It certainly is a query that is interesting, for here, off the beaten paths of an industrial center such as Springfield has been for generations, the genius of Horace A. Moses has established one of the foremost paper-manufacturing corporations of modern times, now employing 750 contented men and women, whose products are marketed in many countries of the world, and whose growth constitutes one of the romances of twentieth century Massachusetts industry.

THE SOUTHWORTH COMPANY

The Southworth Company of West Springfield has an honorable record of more than eighty-nine years in the manufacture of high-grade rag papers. It was incorporated as the Southworth Manufacturing Company, by an act of the General Court in 1839. The first meeting for organization was held April 29 of that year, at Matoneag Falls, in West Springfield, later to be known as Mittineague, when a separate post office was established. The prime movers in the enterprise and the holders of a majority of the stock were Wells and Edward Southworth, who were closely connected with its fortunes until their respective deaths in 1882 and 1869. Reorganized in 1873 as the Southworth Company, its presidents have invariably borne that name, the chief executives having been Wells Southworth, John H. Southworth, George C. S. Southworth, H. Woodburn Southworth and Thomas S. Southworth. The family sequence bids fair to be continued indefinitely.

In the earlier days of the mill, paper was made by wire cloth cylinder process, subsequently replaced by the more efficient Fourdrinier machines.

Before the introduction of steam-heated cylinders, and as late as 1849,

this initial drying of the paper was accomplished over a "fire dryer," or sheet iron drum in which was maintained a wood fire, coal being scarcely known, even on railways. This enormous chamber, about fifteen feet in height, occasionally became overheated and burned the woolen blanket which controlled the paper passing over it. Rags for stock were at times very difficult to obtain in sufficient quantities, especially during the Civil War. Despite early difficulties which were akin to those experienced by all pioneers, the Southworth Company prospered, and its officials were the first paper-makers to employ traveling salesmen.

In 1883 fire destroyed the old wooden mill, but it was rebuilt in 1884. More recently the mill has been electrified, and the best of new machinery has been installed for making fine quality papers by modern processes.

It is believed to have been the first mill to engage in the manufacture of typewriter papers, making a large tonnage for Remington until 1913, when the Southworth Company began marketing typewriter paper under its own name.

Within the walls of the plant was developed the "De Luxe" process of visible watermarking for which the company holds exclusive patents.

H. Woodburn Southworth, son of the founder, and a former president of the company for twenty-four years, now living abroad, recalls that early letter paper was folded and ruled on the first three pages only. It was as much a part of a child's education, as the writing of the letter, to learn to again fold the sheet so accurately that the unruled fourth page would serve as a cover and for the address.

Even as late as 1859 envelopes were so little used that Mr. Southworth could easily carry the small requirements of the customers of the considerable Philadelphia warehouses of the company, from the little shop where women made them by hand. He thinks it probable that he is the only survivor of those who attended the first meeting of The Writing Paper Manufacturers Association, held in Pittsfield, February 13th, 1861.

The Southworth Company has had a just pride in maintaining the tradition of high quality of its product. In the rapid evolution of manufacturing processes it has kept abreast of the times or has led the way. The active management of its business is now in the hands of Melvin D. Southworth and his brother, Edward Southworth, grandsons of one of the founders.

Thomas S. Southworth is president; Edward Southworth, secretary, and Melvin D. Southworth, treasurer. Between 125 and 150 operatives are constantly employed, and the corporation maintains offices in New York and Chicago.

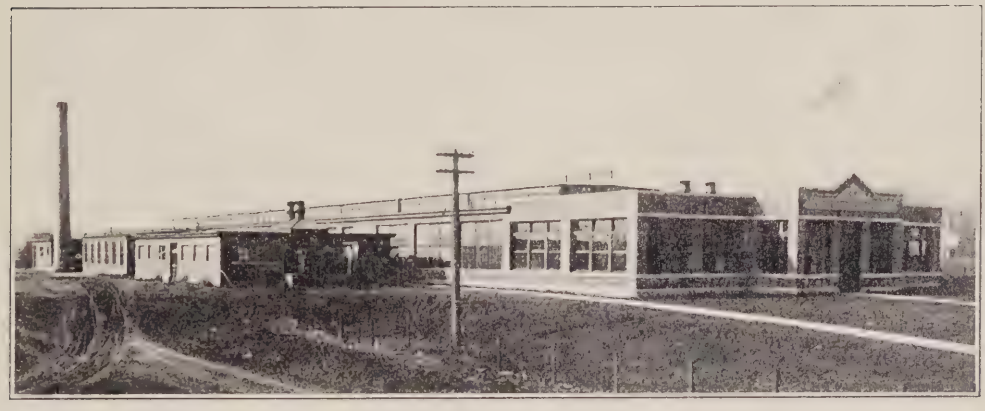
THE WICO ELECTRIC COMPANY

The Wico Electric Company, whose plant is in West Springfield, is the successor to the Witherbee Igniter Company. This latter unit was incorporated in 1904, and was engaged in the manufacture of electrical specialties, chief among them being the Witherbee storage battery. The company was the first in the field with a portable storage battery for automobile use, and can rightfully be called the pioneer in the automobile battery field. The trade name adopted by the company was WICO, using the first letters of the corporate name.

In 1907 work was started on a machine known as the WICO igniter. The announcement of an ignition apparatus which would start from the seat of an automobile created quite a sensation. After an unsuccessful

attempt to produce this machine, the multi-cylinder plans were abandoned and single cylinder ignition was manufactured on a limited scale, along with which an intensive development campaign was carried on.

The Springfield plant of the company was opened in 1909, on Birnie Avenue, where suitable quarters were rented to accommodate the manufacturing needs. For six years the concern remained at this location, but the expansion of business caused it to move to larger quarters, on Liberty Street, in 1915. Here it occupied a building which was used exclusively for the manufacture of the company's products. In 1922 the present plant was constructed. The company has about six and one-half acres of ground, which affords a splendid manufacturing site.



WICO ELECTRIC COMPANY, WEST SPRINGFIELD

The realization of the company's aims came in 1918 when it placed on the market a single cylinder magneto, the result of all the years of experimentation and development. Since then this model has swept the field and is a recognized standard in ignition for single cylinder stationary and portable engines. It was in 1920 that the company was reincorporated under the laws of Massachusetts, using the trade name as the corporation name. Almost twenty years after the first development of the old WICO igniter, the company is again engaged in the perfection of multi-cylinder models, built along the lines of its successful single cylinder ignition.

The concern is still in the battery business, supplying practically all of the American-made motorcycles with lighting equipment.

In addition to the Hampden County plant, another is operated in London, England, to take care of Continental European business. A large service branch has been maintained for a number of years in Tulsa, Oklahoma, to handle the company's oil field business, and the company also operates an office in Los Angeles.

The concern has capital of $730,545 and employs 200 operatives. Phelps Brown is president, Edward L. Stoughton is vice president and treasurer, and George W. Howe is assistant treasurer.

THE WORTHY PAPER ASSOCIATION

The Worthy Paper Association, whose plant is at Mittineague, employs 100 hands in the manufacture of writing paper, and is one of the long-established paper units of the famous Connecticut Valley, having been formed in 1872, with $100,000 capital.

The plant was located on the site that had been utilized two centuries

before by the pioneer grist mill, of Agawam, and fifty men were employed in 1879 when 3,500 pounds of stock were daily used in producing blank-book and writing paper.

One hundred operatives are employed today in the manufacture of writing paper. Edgar S. Bliss is president and treasurer; Frederick W. Main, is vice president, William J. Tower is secretary, and Gorham Bliss is assistant treasurer.

THE PERKINS MACHINE & GEAR CO.

Industrial America runs on gears, so much so that "gear" has become a household word and is widely employed in both a literal and figurative sense to express the activity and speed that distinguish our operations in all lines. As gears play an essential part in all main lines of production, so the production of gears themselves has become an important and steadily growing industry. In this field West Springfield enacts a worthy and progressively important role.

In 1911, the Perkins Mfg. Co., Inc., then successfully engaged in the production of gears, was incorporated as the Perkins Appliance Co., Inc., the founder, Julian L. Perkins, becoming president, and his brother, James A. Perkins, being chosen treasurer. Subsequently, the name was changed to the Perkins Machine & Gear Co., under which designation the concern has become a leader in the manufacture of gears for electric appliances for household use. Several of the most popular makes of electric washing machines obtain virtually their entire supply of gears from this establishment. From electric washers the concern has gone extensively into ironers, wringers and other appliances having small gears as a component. It has more recently engaged in quantity production in large-sized gears, required in heavy machinery production of various kinds while also adding further to its output of small gears.

Its new Multi-Cut machine, first employed in the Perkins plant and since introduced in improved form in other local and distant factories is adapted to the rapid production of small metal parts in a wide variety of industries, such as automotive, electrical and hardware and is said to embody a revolutionary principle. It was primarily developed for rapid cutting of gears and in this application it was an advantageous aid in placing the Perkins plant on a large production basis and is said to have effected a great saving in the cost of tools as in other production cost factors. The precision of its work is counted as a further important asset.

In 1927 the concern purchased the then idle plant of the Springfield Metal Bodies Co., in West Springfield, and removed its operations to this factory, where increased facilities were afforded. Upwards of 300 hands are employed. In 1929, due to unfilled orders running in excess of $300,000 the company operated most of its plant on a 24-hour per day basis, and installed many carloads of new factory equipment.

The factory consists of two parallel units, each 480 by 90 feet in dimensions, running back from the front of the establishment, affording the concern upwards of 96,500 square feet of area.

The production of gears for the "talking movies" has increased in a marked degree during recent months, and an increased volume of its products now enters into export trade.

The corporation has capital of $500,000, and J. L. Perkins is president, J. A. Perkins and John Oakley are vice presidents, Frederick H. Rich, secretary, and John J. Duggan, treasurer.

THE COGSWELL MANUFACTURING CO.

The Cogswell Manufacturing Co. is one of West Springfield's fast growing industries, and has found it necessary to operate overtime within recent years in order to keep up with orders for the various special machines and devices it produces.

It was established in 1912 in Springfield, where it remained until 1922, when it outgrew its facilities, and it now occupies a large brick factory, in West Springfield, with ample room for expansion. Founded by Frederick B. and Lloyd B. Cogswell, to carry on specialty manufacturing, it enjoyed a steady growth up to the time of the World War, when the two owners closed the plant for two years, in order to give their services to the United States Government.

The single gasoline engine and lathe with which they started have been replaced by the most up-to-date tool-making and production equipment, and the company manufactures radio and electrical valve units, magneto parts and a large variety of metal stamping and screw machine products and has complete facilities for polishing and nickel plating the finished product. It makes the British Standard Weights and Measures seal for the Gilbert & Barker Manufacturing Company, and other concerns engaged in foreign business, and among its customers are many of the manufacturing firms in Springfield and West Springfield.

With the development of the radio business in 1922, the company designed and built variable condensers which have become a very profitable line of merchandise. Each year, new and advanced designs in condensers have been placed on the market to meet the exacting demands of the modern radio set manufacturers.

The assembling of condensers for rush orders makes necessary the highest efficiency in production in the minimum length of time, and the Messrs. Cogswell designed a belt system to meet this special need. Located in a central position above the level of the workers' table the belt travels at a definite controlled rate of speed, and there are approximately 30 operations in assembling the finished gang condenser units. A finished condenser is taken off the end of the line every one or two minutes according to the rate of production desired.

One of the latest products of the Company is the Chapman Quick Acting Electric Limit Switch, made for the Chapman Valve Manufacturing Company of Indian Orchard. This is a radical development in switch design and makes possible the electrical operation of gates on gas, oil, air, water and steam lines. Previously, it was necessary to open and close the gates by hand, a process resulting in delay and inconvenience. In case of a break in the line it is, at present, necessary to send mechanics to the shut-offs at each side to close the gates before beginning repairs. With electrical control, the crew can start at once to the break itself while the engineer at the central station closes the valves on each side of the break.

In order to have effective electrical control of the gates it was necessary to limit the travel of the motor unit in each direction by making and breaking the contact instantaneously, and to meet the exacting requirements the switch is made "simple, rugged and efficient." These conditions have been successfully met by means of special insulation, both acid and moisture proof, including ball bearings and special moisture and gas-proof packing. The electrical portion of the unit is operated from central stations of the push button type, or it may be started and stopped by float switches or pressure gages. Provision for changing from motor to hand

operation in case of current failure is made by means of a throwout switch. This serves as a protective feature to workmen, as throwing out the lever renders all electrical operation impossible.

The progressive belt assembly plan is employed in the production and assembly of these switches so that as the demand increases, the number of units may be increased with a minimum effort.

The company also manufactures for W. P. Dodge, of Springfield, a new valve invented by him, while an automatic device for bunching asparagus and other market garden crops, a number of new machine products, and a line of small tools, are included among the commodities produced by the concern.

In 1928 a new automotive novelty in the form of a luminous policeman, mounted in the rear window of the car and signalling approaching traffic was placed in production. The figure is made of celluloid, of the size of a small doll and has a red blouse. When the car comes to a halt this figure is illuminated and one hand is raised in the air, the device supplementing the ordinary stoplight. William R. Kunz, of Springfield, is the inventor of the novelty.

THE NEW ENGLAND SMELTING WORKS, INC.

The New England Smelting Works, Inc., whose plant is located in West Springfield, added forty additional hands to its force in 1928, and operated much of the time on a 24-hour schedule.

During 1927 the concern increased its production by 15 per cent over 1926, and in 1928 it turned out about 80 tons of lead, tin, solder, type metals, babbit, and special white alloys weekly, and does an excellent export business.

Isaac Brown is president, Louis Saffer, vice president, Moses Saffer, secretary, and A. J. Saffer, treasurer.

DOWAE TOYS, INC.

In 1928-29, Dowae Toys, Inc., of West Springfield, brought out a new line of power-driven airplanes that had their first showing at the Toy Fair in New York, the latter year. Three models are included known as the Cabin Transport, senior and junior models, and the Albatross model. Power is furnished by a rubber band which is stretched the length of the plane and wound 400 or 500 times, the unwinding of it acting on the same general principle as a mechanical motor on a phonograph. By this action the smaller Cabin Transport is carried a distance of about 500 feet and the larger about 700 feet. The junior model is of the single-pusher type and is twelve inches long and has a wing spread of sixteen inches. The senior model is of the same general design but has dimensions twice as great. The fuselage of the Cabin Transport planes is made of balsa wood and the ribs are wound with Japanese silk.

The Albatross model is a large speed plane built closely on the lines of a regular airplane and said to be capable of a sustained flight of six to ten minutes over an estimated distance of a quarter of a mile or more. It is forty-two inches long and has a forty-two-inch wing spread. Its main fuselage is of duralumin, tubular construction, which material also is used to house the motor, which is rubber. All materials are light weight and ball bearings are employed to reduce resistance and increase the speed of operation.

Along with these new models of power-driven planes the company

has produced a construction kit for the use of boys who wish to build their own planes.

The officers of the company are Raymond E. Dowd, president and treasurer, and Bernard J. Dowd, secretary.

OTHER INDUSTRIES OF WEST SPRINGFIELD

In 1919, the General Fibre Box Co. was founded to manufacture corrugated and fibre shipping cases and a few years ago erected a modern plant in West Springfield, to which it made a substantial addition in 1929.

The company has capital of $200,000 and employs 100 operatives. C. J. Schoo is president and treasurer, and S. E. Rossetter, vice president and secretary.

A West Springfield unit whose volume of production has grown by leaps and bounds during the past few years, especially in 1927 and 1928 which were the banner years of operation, and which necessitated increasing its capital in the latter year from $100,000 to $300,000, is the National Library Bindery Co., which specializes in the binding of books for public, business, professional, educational and private libraries. During 1928 the concern built and occupied a new bindery plant, in East Cleveland, Ohio, which brought its chain up to five, the others besides the West Springfield and East Cleveland units being located in Indianapolis, Atlanta and Philadelphia.

Oscar Schnabel is president, F. M. Rowe, vice president, and Gerald B. Van Deene, treasurer and general manager.

The Heatbath Corporation, one of West Springfield's recently established enterprises, introduced in 1928 a new electric furnace for hardening high-speed steel, and treating that material at a temperature as high as 2,400 degrees, thus enabling the metal to be taken from the bath with a smooth, clean surface, doing away with much smoothing and polishing attendant upon the use of the old-fashioned ovens, and making for rapidity and economy of production.

It is claimed that the temperature in this furnace can be controlled with the same certainty and exactness as with electric furnaces used at lower temperatures. The Heatbath Corporation has been producing electric furnaces for the last eight years. Ernest A. Walen is president, Raymond E. Clark is treasurer, and J. T. Bogrette is chief engineer.

In 1929 the concern materially expanded its activities in the electric furnace field. That year it installed what is said to be the largest electric pot furnace in operation in New England, 110 inches long, for the Bailey & Blendiger Company of Woburn, for use in tempering machine knives for industrial uses. Two large pot furnaces were also installed for Wallace-Barnes Inc., of Bristol, Conn., to be used for hardening and tempering springs.

A distinct advantage of the concern's furnaces is said to lie in a self-compensating feature, enabling the apparatus to perform its work without strain by establishing a proper balance between the number of pounds of material being treated per hour and the amount of heat generated. The heat required to bring the load from cold to treating temperature, instead of being drawn from the element directly, is drawn from a heat reservoir created by the proper proportioning of the element to the number of pounds treated per hour. The Heatbath Corporation is said to be the sole licensee to make this type of furnace.

The company is now putting more widely on the market its Heatbath Black Process, a system of rustproofing that it has been developing for

some time past and is used by manufacturers of spark plug shells, wood screws, bolts, gun parts, typewriter parts and many other products. The process is applied by immersing the metal parts in a heated chemical compound. This treatment by a non-acid preparation is said to have a high degree of permanency and will resist the action of alcohol. It involves no change in dimensions of the product. Being inexpensive and simple of application, this process is said to have been a valuable factor in reducing the cost of finishing bolts and screws as well as many small parts that enter into the mechanism of typewriters and various other machines.

The Agawam Paper Co., unit of the American Writing Paper Co.; the plant of John C. Michaud, engaged in producing clothes dryers; and the West Springfield Chemical Co., owned by R. D. Dupius, producing bleaching-water, are among the other industries of West Springfield.

The story of the Gilbert & Barker Mfg. Co., whose plant is in West Springfield is treated in the chapter devoted to the industries of the city of Springfield.

Located in West Springfield is the F. M. West division of the New England Box Co., which caters largely to the diversified demands of the hundreds of manufacturers in Springfield, having devoted one part of its plant to the production of thin and heavy re-sawed shooks and another part to high-grade, fancy finished boxes. A large addition to this factory was erected in 1929.

THE INDUSTRIES OF WILBRAHAM

Up to 1865 Wilbraham gained little prominence as an industrial town, although grist, saw, carding and fulling mills, and a small tannery, were early established, but were of minor importance. The mills at Butlerville were built in the sixties, and soon became extensive producers of fancy cassimeres.

In 1872, the Collins Paper Co. was established at North Wilbraham, with $200,000 capital, and four years later the name was changed to Collins Mfg. Co., when the capital was increased to $300,000. Later it became a part of the Whiting chain of paper-making enterprises. From its inception it has maintained a high place as a producer of bond, ledger, currency, and fine writing papers, from 100 per cent rag down to 25 per cent rag content grades, and in 1928 engaged as its sales and advertising counsel, Charles H. Barr, of Holyoke, to develop effective plans for the coöperation of mill and merchant in the marketing of Collins papers. Samuel R. Whiting is president and treasurer of the corporation, which employs 350 operatives.

The Cutler Co. was established as a wholesale grain and cereal business at North Wilbraham in 1877 by S. N. Cutler & Co., a firm that originally began business at Ashland, in 1845.

Today it operates numerous branches in Hampden, Worcester and Middlesex counties, employing some 75 hands. Henry W. Cutler is president, Richard J. Sackett, vice president, Robert W. Ellis, secretary, and Joseph M. Perry, treasurer.

CHAPTER XXXI

NORTHAMPTON

CELEBRATED ALIKE FOR ITS TOOTH BRUSHES, SILKS, SILVER AND ELASTIC FABRICS

The city of Northampton is internationally famous as being the home of one of America's most distinguished and best loved citizens—a former President of the United States,—the Honorable Calvin Coolidge, who successively served it in the Massachusetts Senate, next as President of that body, and then, entering upon a field of usefulness to all the people of the Commonwealth became their Lieutenant Governor, and ultimately the Governor of the state for two years, in the administration of which office he found himself, in 1919, perhaps the most talked about public servant in the nation, when he successfully met a crisis such as come to few men in the course of public office and the outcome of which resulted in a coast-to-coast demand for his services as expressed in his unanimous nomination and election to the Vice Presidency of the United States, and his subsequent elevation to the office of President by succession, as well as by electoral and popular choice of the people.

The unwarranted assertion has been made, born of personal jealousy, nurtured by political animosity, and persisting until in some quarters it has assumed a semblance of fact, that as Governor of this Commonwealth, Calvin Coolidge fomented political capital out of the Boston police strike in the hope of climbing to the Presidency upon the fame and prestige following in the wake of his action.

In view of the facts known to those who were most intimately connected with the situation in 1919 no greater calumny was ever perpetrated upon a public servant than has been bandied about by irresponsible persons who know little or nothing concerning the incident. Far from seeking personal or political advantage, Governor Coolidge faced the crisis in the solemn belief and conviction that, performing his duty in accordance with the oath of office he had assumed, and as he was firmly determined to carry it out, it would mean the end of his political career.

Some days prior to the day when the sworn guardians of the peace deliberately flouted the law by precipitating the strike, and while those associated with the Governor were insisting that nothing of serious import would occur, he realized the inevitable march of events.

It was then that he addressed one of those frank and confiding letters to his father, in that humble little cottage in Plymouth, Vermont, where, a few years later, the recipient of the missive was to have the signal honor, as a county squire, of administering to his only son the oath of office to the highest position of authority in the world—an episode that in all the annals of the republic had never previously occurred.

It was a letter such as one would have penned, in terms of filial affection and love, to the man whose judgments he had implicitly followed and respected from boyhood. "Serious trouble with the Boston police seems to be inevitable," he wrote. "If it comes, my duty will be clear and I shall not shirk it. I am, however, convinced that doing my duty will mean the end of my political career. I am writing so that you may be prepared."

In that communication, he breathed his honest belief, but there were no murmurings of discontent with his lot; no fervent hope that the cup of bitterness would pass from his lips; nor did he express open displeasure because the Chief Magistrate of the nation had misinterpreted the situation in the capital when the members of the Washington police force had joined a labor union.

A life student of the science of government, Calvin Coolidge, foresaw that the real and final issue in the Boston crisis would be the supremacy of the law, and the continuance of order.

Carefully avoiding even the appearance of an intrusion upon the responsibility of other officials, he patiently studied every statute and available precedent, depending for legal advice upon Attorney Henry A. Wyman and Former Attorney General Herbert Parker.

He made it entirely clear to all who consulted him that the Commonwealth was not a party to the wage dispute, the solution of which lay in the hands of the Police Commissioner of the city of Boston, an appointee of the Governor's.

"The internal direction of the police department is wholly in the hands of the police commissioner," the Governor said. "I have no authority in the matter. My only authority is over the police commissioner, and when I have appointed him, it is his business to administer the department."

When confronted by labor leaders, who marched to his office and demanded the removal of Commissioner Curtis, the Governor's calm and cogent answer was: "I shall support the Commissioner."

When one of his furious auditors shook his clenched fist in the Governor's face, and vehemently asserted: "If you take this stand you will never again be elected to public office," Governor Coolidge believed his critic without reserve, but entirely unmoved, he calmly replied: "It is not important that I should be."

Then came the fateful hour of 5:45 o'clock, on the afternoon of Tuesday, September 9, 1919—the hour for the evening roll calls—when a thousand or more sworn guardians of law and order struck.

The Governor had made known to Mayor Peters, of Boston, his willingness to order into service the units of the State Guard if those stationed in Boston were deemed insufficient in number to quell riots or other disorders, and, in addition, to place at the disposal of the Mayor the 100 members of the Metropolitan Park Police, and of the State Police, all of whom were under the control of the Chief Executive of the Commonwealth.

But Mayor Peters did not even call out the local units of the State Guard, that first night, nor did Commissioner Curtis provide the 700 substitute officers whom he had assured the Governor would report for duty if any patrolmen deserted their duty.

The dawn of Wednesday, September 10, found Boston thoroughly frightened. The riots and disorders of the night before, with their assaults, robberies, damages to property, and other acts of organized ruffians, were followed by the boarding up of windows, the barricading of doors with barbed wire, and the exodus of terrified men and women with their money and valuable personal effects.

The forenoon wore on without a semblance of the restoration of public order, and with no move on the part of the municipal authorities to summon the local militia.

The Governor issued a statement that for two days he had held him-

self in readiness to meet any request for assistance. Mayor Peters countered with the statement that "until riot, tumult, or disturbance actually takes place the only person who has authority to police the city is the police commissioner, and he is appointed by the Governor." Late in the day, the Mayor called at the office of the Governor, and was asked if he wished additional troops from outside the city, and receiving an affirmative reply, Governor Coolidge immediately ordered out the Fourth Brigade, and, subsequently, two additional companies.

Later, when word reached the State House that the Metropolitan Park Police had joined the strikers, the Governor offered to ask for Federal troops if Mayor Peters thought this course necessary.

Before the State Guard could be fully mobilized another night of terror passed, with rioting rampant, stores looted, men and women held on the streets and robbed, and many women subjected to brutal assaults. Organized mobs patroled the streets and were dispersed by the handful of state guardsmen only to gather in larger numbers and charge the soldiers. Three persons were killed, and several wounded.

It was announced that on the evening of Thursday labor unions were to vote on sympathetic strikes. The firemen of the city threatened to quit, while the electrical workers announced their intention to plunge the city into darkness.

It was then that organized industry came to the rescue of the city by instantly inaugurating a systematic campaign to bring into service, from manufacturing plants located outside of Metropolitan Boston, call firemen employed in them, chauffeurs, drivers, hostlers, and electricians conversant with the operation of power, heating and lighting plants, and within 24 hours a list of 1500 available men was built up following a drive via the telephone. The result of this effort led to a delay on the part of the unions, and ultimately the sympathetic strike died.

It was apparent on Thursday that the city could not protect citizens or property, and that the Boston situation was one of law or of anarchy.

Governor Coolidge moved swiftly, invoking his authority as commander-in-chief of the State Guard, and issuing a proclamation in which he called on all citizens to rally to the defense of society. He despatched telegrams to Secretary of War Baker and Secretary of the Navy Daniels asking them to hold themselves in readiness "to meet any application that I may be compelled to make," and adding, "We shall maintain law and order at whatever cost."

Federal troops were unnecessary after Governor Coolidge had spoken. The next day—Friday—witnessed the striking police on their knees, pleading for the reinstatement that never came.

Labor leaders hastened to the State House with an olive-branch from the late Samuel Gompers, who had previously intervened, but who had received a reply a few days before from Governor Coolidge, couched in words so simple but effective that they will live forever: "There is no right to strike against the public safety by anybody, anywhere, at any-time."

Gompers still hoped for a compromise, but his emissaries were told by the Governor that there was nothing to compromise.

The Governor was interested in the movement started by industrial, commercial and financial men in the Commonwealth to reimburse those who had suffered an impairment of their earnings, and in some instances, injuries, as the result of their military service during the strike and until the time came for the withdrawal of the troops, and it was a satisfaction

to him to note that a fund of more than $500,000 was raised within a few weeks.

The quality of courage is so unusual in high public office that this conspicuous display of it instantly focused attention on him, and as there are more supporters of law and order in the United States than there are fomenters of disorder it was but natural that there should arise from the Atlantic to the Pacific a demand for his services in the nation.

Twenty-five leaders of the Republican party had decided upon Senator Lenroot, of Wisconsin, as the candidate for the Vice-Presidency, in 1920. He had been placed in nomination, at the convention, in June, and had been supported by several of his colleagues, including Senators from the important states of New York and Ohio, who purported to represent their respective state delegations, when a modest delegate from the state of Oregon arose, demanded attention and nominated Calvin Coolidge, of Massachusetts. Seldom, if ever before, had a political gathering been so instantaneously swept from its moorings. Here was a candidate who, with but a heart-beat between him and the Presidency, would measure up to the best traditions of the office, and keep sane the national outlook, but his candidacy, such as it was, went about of itself without any apparent instrumentality. The same courage he displayed in 1919 was demonstrated in the soldiers' bonus legislation, the League of Nations discussion, the two farm relief measures, and in his resolution not to accept a second elective term despite his popularity and absence of opposition in the convention in the event that he desired to be a candidate.

COLONEL EDWARDS—THE PIONEER TANNER OF HAMPSHIRE COUNTY

The first tanned leather manufactured in Hampshire County was shipped from Northampton, to the Boston market, in 1794, and was produced by Col. William Edwards, who began business there four years before, when he was less than twenty years of age. At that period, he inaugurated a series of improvements in the mechanical branch of the art which, when perfected, were adopted and extended by others, to the signal profit and extension of the manufacture of leather. Edwards was one of the first in the leather trade to infuse a greater spirit of enterprise into the business. The construction of his works was carried forward on an improved plan, as compared with others then in operation throughout the country. Colonel Edwards had served an apprenticeship of four years for his board and the privilege of tanning with his master's stock four sheepskins a year, at Elizabethtown, N. J., and afterward he labored as a journeyman for thirty dollars per annum and board.

The rude appointments of a tannery, as generally built before his time, embraced a greater or less number of oblong boxes or hogsheads sunk in the earth near a small stream, and without cover or outlet below, which served as vats and leeches. A few similar boxes above ground for lime vats and pools, an open shed for a beam house, and a circular trough fifteen feet in diameter, in which the bark was crushed by alternate wooden and stone wheels, turned by two old or blind horses, at the rate of half a cord a day, completed in most cases the arrangements of the tanyard. As an improvement on this method, Colonel Edwards began by laying down a trunk of plank made tight underneath his vats to carry off the spent liquor; then a junk to receive it; next leeches above ground in tiers, one above another, raising the liquor by a suction pump worked by two or

four men, and he erected substantial buildings over his beam house, and handles, using the lofts for a currier's shop.

He early built a bark-mill on a stream five miles from his tannery, and near the region where his bark was ground by waterpower, using at first mill-stones and afterward the several iron-mills invented by others. His method is believed to have been the first departure from the old horse-mill.

This humble beginning, with a stock of fifty hides, and an improved mechanism and arrangement of the tannery, was afterward brought to a high degree of production.

In 1809 The Hampshire Leather Manufacturing Co. was incorporated, with $100,000 capital, most of which was subscribed by Boston merchants, who purchased the extensive Edwards tanneries located at Northampton, Cummington and Chester. They then had a capacity of 16,000 full grown hides, and included three bark mills, three hide plants, and three rolling machines, all operated by water power, with copper cylinders for applying heat in the extraction of the tannin. Colonel Edwards was more responsible for the improvements in processes than any of his contemporaries, and the operations were carried on by him for quite a period of time at the three plants in the western part of the state, under an arrangement he made with the new stockholders.

In 1812, Colonel Edwards was granted three patents on tanning—two on October 19, covering a process, and on a roller to be used in preparing leather, and the third, on December 30, for tanning sole leather. All were capital improvements on previous methods, the rolling machine enabling the currier to give leather the smoothness of surface and the solidity of texture hitherto peculiar to hammered leather.

SAMUEL WILLISTON—NORTHAMPTON'S INDUSTRIAL GIANT AND PATRON SAINT

"Button, button, who's got the button" is a game which was played seriously and intensively by Samuel Williston, and his good wife and upon which the industrial life of Northampton may very properly be said to have been founded.

In 1822, Williston then eking out an existence as a farmer and school teacher was aided by his wife who covered buttons with cloth, and sold a portion of the first gross to President Humphrey, of Amherst College. Upon sending a supply to New York and receiving an order for twenty-five additional gross, at $2 per gross, she employed her neighbors to assist her, and then began a systematic distribution of the raw materials among neighboring families, until by 1826, the business had so increased that Mr. Williston resolved to devote his energies to broadening the field of distribution. In 1827 he obtained customers and established agencies in New York, Boston, Philadelphia, Baltimore, and other large cities, and shortly afterwards more than a thousand families in Hampshire County were at work for Mr. and Mrs. Williston, the manufacture continuing by hand for more than ten years.

Obtaining on one of his New York trips, some buttons of English manufacture evidently made by machinery, he took them to Messrs. Joel and Josiah Hayden, the ingenious mechanics of Williamsburg, and offered to furnish the capital, market the buttons, and divide equally the profits, if they would discover a process, construct the apparatus, and manufacture the buttons by machinery. A year later they had perfected button-making machines, which were set up in their Haydenville plant, and up to 1847 the arrangement outlined by Mr. Williston was continued. That year the machinery was transferred to Easthampton, and Lieut.-Gov.

Horatio G. Knight having entered partnership with Williston in other enterprises became the junior member of Williston, Knight & Co., which concern continued the production of buttons until 1865, when a corporation known as the National Button Co., was formed.

In the meantime, Williston had become interested in the manufacture of suspender-webbing and suspenders, forming a corporation known as the Nashawanuck Mfg. Co., in 1852, and ten years later he was one of the prime movers in incorporating the Glendale Elastic Fabric Co. In 1865 he also interested himself in a company for the manufacture of vulcanized rubber thread.

Amassing an ample fortune during his business career he gave upwards of $1,500,000 to Williston Seminary, at Easthampton, which was named in his honor, and to Amherst College, to Payson Church, to Freemen's societies and to various religious missions.

In 1835, J. Payson Williston, began the manufacture of indelible ink, in Northampton, the product being marketed at that period through drug stores, but today its distribution is made throughout the United States, South America and Cuba. The formula has been kept in the Williston family from generation to generation for almost one hundred years. The commodity is now manufactured by Payson's Indelible Ink Co., of which E. C. Williston is president, R. L. Williston, treasurer, and M. L. Flint, secretary.

In 1836, the Greenville Manufacturing Co. was formed to manufacture cotton sheetings and drills, and from the fifties to the eighties it was one of the city's leading manufacturing concerns, often being referred to as Williston's Mills, because of the fact that for many years prior to the sale of the plant, in 1883, it was managed by Asahel L. Williston, who was president and treasurer of the corporation.

In 1844, Warren's Silk Mill was established.

AN EARLY "GET RICH QUICK" SCHEME

Northampton's oldest and largest continuing industry has a romantic history and although millions of dollars worth of silks are produced each year in the plants of the Corticelli Silk Company, located in the villages of Florence, Leeds and Haydenville, in this state, and in Connecticut, the concern started in a very modest way, in Northampton, almost a century ago.

Since Colonial times perhaps no other phase of Massachusetts industry has been so absorbingly interesting as that attending the wild speculation in the silk trade, coupled with which were the out-croppings of the famous transcendental movement and the fertile attempts to apply its principles to human affairs, all creating profound impressions throughout New England, between 1835 and 1845.

The Corticelli Silk Co. was intimately identified with these occurrences and it may be said that it represents the only practical results that flowed from their widespread influences.

There is nothing in history with which to compare the era of excitement that occurred in Northampton and vicinity during the ten years following 1835 unless a parallel is found in the widespread speculation in oil and natural gas that took place in Pennsylvania, or the discovery of gold in California, in 1849.

The inception of the "get-rich-quick-or-silk" fever followed the lead of Samuel Whitmarsh, of Northampton, who dreamed that the production of raw silk could be profitably carried on in the United States, and whose

example and persuasive powers convinced the citizens of Hampshire County that their real estate holdings held potentialities as the El Dorado, of the East.

Up to the time he began his experiments only the white mulberry had been successfully grown in this country, and with this type of tree he began his operations, soon developing a superior variety on which to feed the silk worms, and he introduced it to the farmers of Northampton and vicinity who believed the success achieved by Whitmarsh offered untold wealth.

He purchased water privileges on Mill River, in 1835, and later 300 acres of land, including a saw and oil mill. Making a trip to New York for financial assistance, he quickly enlisted a response from capitalists, and in October, of that year, organized the Northampton Silk Company, which, the following spring was incorporated by the Legislature. In 1836, the new concern set engrafted trees on 100 acres of land, and by the spring of the following year, the growth appeared vigorous, and a cocoonery was erected, two stories in height, 200 feet long by 26 wide, affording capacity for 2,000,000 silk worms. Despite the fact that the company had no raw silk available for production purposes, machines were imported from Europe and additional machinery of domestic construction for reeling and weaving was built.

In the fall of that year a Congressional Committee came to Northampton, from Washington, D. C., to inspect the plantation and cocoonery, and included in its personnel were Daniel Webster, Abbott Lawrence and James K. Mills, all of whom were strong advocates of tariff protection for American industries.

In 1838 samples of plain and figured satins were woven and Mr. Whitmarsh journeyed to the nation's capital where he presented them to Henry Clay, whose pleasure in receiving these specimens of the domestic manufacture of silk was enthusiastically expressed. The previous year the company erected a four-story brick building 100 by 40 feet, in which the manufacturing processes were carried on and it is a matter of interest that this structure forms a part of the present day Corticelli plant, at Florence.

As early as 1837 the company had embarked on the manufacture of sewing silk, which was marketed in New York City and elsewhere under the trade name of "Northampton Sewing Silk," and which was "used by all the tailors in town." In the spring of that year, Whitmarsh imported $15,000 worth of mulberry trees from Europe, but only a small percentage of them was saved.

During the fall of 1838 excitement ran high in Northampton and vicinity, as the discussions in the newspapers of the day and the recurring accounts of the company's sales made at large profits were too much for even the conservative farmers of old Hampshire County to resist and everybody was anxious to enter the business. The fever spread until it embraced all parts of New England where it was believed the mulberry tree could be grown with success. The price of the trees rose to $1.00 each, then to $2.00, and finally to $3.00, and later, so valuable did they become that cuttings but a few inches long were disposed of for between $2.00 and $3.00 a bud. Greenhouses sprung up over night where mulberry stock was propagated and forced under glass and with artificial heat, in an effort to improve upon nature.

But the mulberry bubble, which had been blown to immense propor-

tions by the speculators, could not stand the strain, and it suddenly burst, bringing ruin to thousands of people in Hampshire County and elsewhere.

The silk company began to go down the industrial toboggan and in 1840 the property it owned was offered at public sale. Joseph Conant took over the assets under a three years' lease, but in 1841 he was forced to relinquish activities, and the next year the entire plant, machinery and land, went under the hammer for $22,500.

Only a comparatively few months intervened before the Northampton Association of Education and Industry, otherwise known as the Florence Community, was founded, by Joseph Conant, of Northampton, Samuel L. Hill, of Willimantic, Conn., and William Coe and George W. Benson, of Brooklyn, N. Y., the organization embodying the peculiar ideas of these and other men who were determined to establish a new social order in accord with the most advanced policies of that era, it being a direct outgrowth of the transcendental movement which was then sweeping over the eastern part of the United States like a hurricane, dominating its adherents with a sincere longing for social reform, benevolence and an earnest desire to improve the lot of mankind.

The Florence Community bought the idle silk plant, formed a stock company, with $30,000 capital, and the spring of 1843 opened auspiciously, applications for membership in the community movement flowing in steadily from all over the United States. Supporters were accepted to membership only on personal acquaintance, and therefore it became necessary for those outside the sacred precincts of Northampton to visit the Community for a few days, or to reside there for a time on probation.

By the first of June that year the silk company reported a substantial profit on its operations, but by fall the treasury was in a somewhat precarious condition. It weathered the following years, the visits of such men as William Lloyd Garrison, Wendell Phillips, George Thompson, Henry C. Wright and others of nation-wide reputation, who addressed the Sunday gatherings of the Community, inspiring confidence and hope in the success of the undertaking.

THE GENESIS OF THE CORTICELLI SILK CO.

In 1845 the stringency of the financial situation, caused by the dissatisfaction and withdrawal of several prominent members, rendered the future of the Community movement uncertain, and by the next year these difficulties had so increased that in November the remaining members voted to dissolve the organization. Samuel L. Hill, one of the charter members, who had labored hard and long to make the experiment successful, assumed the liabilities, disposed of parts of the property, and continued the silk industry. Under his able management, operating as The Nonotuck Silk Company, the business took on new life, thrived and grew.

With the introduction of the sewing machine, it was found that sewing silk as then marketed was not in all respects suitable for efficient use on the new device, and after a long period of experimentation, the Nonotuck Silk Company, of Florence, succeeded in producing a machine twist silk, which, being tried by the Singer Sewing Machine Company, proved to be perfect. The first lot of this then new industrial product was manufactured and spooled at Florence, in February, 1852. The company found its horizon of distribution greatly enhanced after it placed the machine twist silk on the market and it grew by leaps and bounds until in the '70s, it was the largest concern of its kind in the world, employing as early as 1872, 350 hands.

In the last quarter of the nineteenth century, when the company had attained rank as one of the largest silk manufacturers in the United States, the name "Corticelli," an Italian word for high quality silk, was adopted for some of its chief products, and at about this period the well-known kitten was chosen as a trade-mark. Gradually, Corticelli was applied to more and more of the products of The Nonotuck Silk Company, and in 1922 it seemed desirable to change the corporate name to Corticelli Silk Company, under which all of the commodities are advertised today.

In addition to the three factories operated by the concern in Florence, Leeds and Haydenville, in this state, it maintains two others, in New London and Norwich, Conn., as well as offices in Boston and New York. The concern is capitalized for $1,500,000 of preferred stock, and 50,000 shares of no par common stock, and it employs 1,800 men and women.

F. W. Eaton is president, J. P. T. Armstrong, first vice president, C. A. Sheffeld, second vice president, and H. D. Lee, secretary of the corporation.

In 1929, the company engaged in the development of a rayon sewing thread, a new product designed for popular use, but not yet on the market.

Contemporaneous with the abortive attempts to establish the widespread growth of mulberry trees in Northampton, a group of men living on the island of Nantucket formed the Atlantic Silk Company, in the late '30s, with $400,000 capital, all of which ultimately was lost as the experiment to propagate the silk worm there was as unsuccessful as that carried on in Hampshire County.

THE BEGINNINGS OF THE FLORENCE STOVE CO.

The Florence Sewing Machine Company was organized in 1861, with $125,000 capital, which was increased to $200,000 a year later and, in 1866 to $500,000. In 1882 the Crown Sewing Machine Company succeeded the original corporation, and in 1890 the Central Oil Gas Stove Company was organized, and absorbed thirteen oil stove concerns located in various parts of the United States. Included in the merger was the old Florence Sewing Machine Company, and the Crown Sewing Machine Company. In addition to producing oil stoves, the concern built wooden cabinets for silk manufacturers and eventually the business was removed to Gardner, where, under the name of the Florence Stove Company, it carries on business today.

THE ADVENT OF THE BELDINGS

At the very height of the Civil War excitement, in 1863 three brothers —Milo M., Hiram H., and Alvah N. Belding—the former then living in Massachusetts, and the remaining two being employed on a farm in Patterson's Mills, Michigan, now Belding, in that state, formed a partnership for the distribution of silk thread, via the house-to-house peddling route.

The stock was procured through Milo M. Belding, and when the first invoice for merchandise amounting to $145.60, was received, they found themselves in possession of the goods and the bill for it, but entirely bereft of capital with which they might make change when they sold the products to customers. Fortunately, they were soon relieved of this embarrassment by the payment of $3.15 which was due the two brothers in Michigan from a wealthy farmer, residing in Patterson's Mills.

Starting with this cash capital of $3.15 and liabilities of $145.60, they trudged from house to house and village to village, on foot, and in due time sold the merchandise covered by the invoice, paid the latter, ordered another supply, and a little later each of the three partners was able to buy a horse and buggy, and thus enlarge the territory canvassed and increase the sales.

Subsequently they carried their merchandise in large trunks and traveled by train, delivering goods to merchants and gradually abandoning the house to house trade. By 1865 their profits were such that they were able to buy an old paper mill plant, in Rockville, Conn., for $9,500, where they began the manufacture of silk thread. Later the original building was demolished, a new plant erected, and from time to time additions made to it until, in 1876, while seeking a factory in Massachusetts, they negotiated for a mill in Northampton, formerly used by the Ames Manufacturing Company.

The Belding Brothers paid $10,000 for the structure, which was four stories high, and 130 feet long, and upon which at the time there was a mortgage of $25,000, a group of citizens of Northampton agreeing to raise the balance of $15,000 and discharge the mortgage providing the Beldings would pay the amount they agreed and install machinery for the manufacture of silk.

Operations were soon started and in 1879 a 140-foot extension was made to the original plant, followed three years later by another, 160 feet long, these two additions being four stories high.

In 1909 a still larger extension was built, making the four-story plant 550 feet in length.

Up to the time of the merger of Belding Brothers & Company with the Hemingway Silk Company, under the name of Belding-Hemingway Company, the original concern was operating eight separate and distinct manufacturing plants in five cities in the United States, and with the addition of the four mills owned by the Hemingway Silk Company, an even dozen plants were brought together in one manufacturing corporation, together with a substantial stock interest in a large silk mill in Montreal, Canada.

On February 1, 1927, the Belding-Hemingway Company moved into its own building in New York City, from which central headquarters dealings are carried on with the selling offices which the company maintains in ten of the principal cities of the United States. From the beginning the concern has marketed its products directly, and nearly every city and hamlet in the country is visited by the company's salesmen.

From the original capital of $3.15 has grown this great silk manufacturing organization, capitalized for $6,000,000—another outstanding example of what can be done with an idea if Yankee thrift and energy are applied to the problem.

It employs 400 operatives in fabricating the silk goods it produces and the Northampton plant is equipped with 50,000 spindles, 525 looms, and complete dyeing and bleaching departments.

A. N. Lincoln is president, H. M. Merriman is vice president, and F. C. Larkin, treasurer.

THE PRO-PHY-LAC-TIC BRUSH CO.

In the period when Andrew Johnson was President of the United States; when Mexico was a dependency of France; when life insurance was in the experimental stage, and much distrusted; when Horace Greeley was



PRO-PHY-LAC-TIC BRUSH COMPANY,
FLORENCE, 1867
Original Building



PRO-PHY-LAC-TIC BRUSH COMPANY, FLORENCE, 1928

urging young men to go West; when the man who built the first American motor car was a twelve-year-old urchin; when there was but one dentist for every 10,000 people in this country and less than ten dental colleges in the land; when good ready-made clothes were unknown, and when cobblers made shoes, and hatters made hats to order; when photography was a new art, and when the daguerreotype was the prevailing piece-de-resistance, George A. Burr, Isaac S. Parsons and D. G. Littlefield organized the Florence Manufacturing Company, in May, 1866, and began the manufacture, in the village of Florence, a part of Northampton, of daguerreotype cases, button, jewel and revolver boxes, and medallion cases, out of a material called Florence composition.

Perhaps the reader recalls these daguerreotype frames—elaborately carved affairs, made of a bright black substance, that much resembled hard black rubber, but brittle as one found it if he chanced to drop one, and fitted with hinges and lined with soft satin-covered cushions.

Florence composition had been made previous to the organization of the new company, in another factory near the site of the present large establishment of the Pro-phy-lac-tic Brush Co.

It was not long before these men realized that the daguerreotype case business would not last forever—or even much longer—and, as an experiment, one of them picked up a small oval medallion frame, fashioned out of the composition, whittled a flat piece of wood to fit it, and punched this piece full of holes. He next bought some bristles and stuck them in these holes, glued the piece of wood to the medallion, and lo, the first brush produced in Florence was complete. It made no particular difference whether it was a hair, clothes, or shoe brush. It was crude, but it was a brush, and a new use had been found for Florence composition.

That pioneer brush is still on exhibition. It is like no hair brush ever seen on land or sea. So excited were the makers that they fastened the bristles to the back instead of the front.

But the second attempt was a complete success. That brush today—if taken out of the Florence Museum—would command a good price anywhere, because it is a corking good brush—every detail worked out by hand, with all the imperfections that go with hand work it is true, but with the sturdiness and ruggedness which the hand made article possesses.

With a rush of enthusiasm they set to work to make a hair brush with a composition back, and later hand mirrors and manicure fittings were manufactured of the same material.

The shape of a hair brush is one of the things which the ages are not likely to see changed. The oval brush-part and the length, shape and curve of the handle are right. They can no more be improved than the shape of a violin can be bettered.

Square brushes, round brushes and rectangular brushes have been popular at times, but their popularity seldom lasted long. Hair brushes were the same shape they are today when hair-dressings were so elaborate that the British Government found it necessary to impose a tax of a guinea a pound on hair powder in order to abate the extravagance in hair dressing in which all people "of quality" were indulging.

And so, the Florence Manufacturing Company, the corporate predecessor of the Pro-phy-lac-tic Brush Company, is the oldest tooth brush factory in America.

The first tooth brushes manufactured in Florence were made by a man sitting at a chuck, a piece of bone before him, boring one hole after another, gauging by his eye the distance apart these holes were to be.

Today, one machine bores forty holes at one time and still another machine of almost human intelligence, not only bores the hole but picks up a tuft of bristles, binds them tight with a silver band and fixes them securely in the hole.

The curved handle, one of the most distinctive features of the Pro-phy-lac-tic brush is cut from thigh bones of cattle. No other bone has this curve. Celluloid handles can be shaped, and are flexible, but comparatively new.

When the first celluloid handle tooth brushes were made, there was much shaking of heads among the older tooth brush makers, and not a little of the same sort of doubt among the trade. As the shoemaker said, "there is nothing like leather," so did the bone cutter say, "there is nothing like bone."

But the pyroxylin handle found its place—yet wonder of wonders, it did not displace the bone-handle brush.

A peculiar feature of tooth brush making seems to be, the more brushes made, the more brushes needed. Twenty-five years ago, it was not every man who owned a tooth brush. Today, in practically every home there is a tooth brush for each individual member of the family. The ratio of tooth brushes sold now, to that of the sale of tooth brushes when the Pro-phy-lac-tic brush was first made, is as five thousand to one.

It is interesting to record that this change from neglect of the teeth to the care of the teeth did not just happen, like "Topsy," but it has been thoughtfully and untiringly fostered and promoted by this establishment in the foothills of the Berkshires to which the pick of the world's bristles has for more than sixty years been going.

It does not often happen that a manufacturing concern is destined to figure as conspicuously as the Pro-phy-lac-tic Brush Company, in a broad humanitarian service. It is probably not too much to say that the whole of America has gone to school to this company, and has learned many lessons of basic importance from it.

Its main object, of course, has been to sell its product. But in promoting its sales, it has relied, not upon the customary slashing attacks against competitors, but in addressing the public in a new and persuasive language. In the midst of the din and confusion of the ordinary language of merchandising, an entirely different voice began to be heard, one that preached a more intelligent care of the teeth, until, little by little, people grew attentive and began to give heed.

At a time when no one seemed to care particularly whether a person's natural teeth remained in or came out, the Florence organization appeared with that genius for pioneering that seems to be bred into the Yankee bone. It found Americans brushing their teeth with all sorts of brushes that had been evolved from the original "chew sticks" gnawed by the ancients. But this company discovered what it considered a much better design for a tooth brush, invented by a prominent New York dentist, which it promptly adopted.

From that day to this, identically the same design has been used. Other designs have come and gone, but none seems to have proved equal to the original.

A PIONEER IN MANY THINGS

Few business concerns have had such happy opportunities as the Pro-phy-lac-tic Brush Company, to inaugurate so many valuable efforts and

then to carry them out. It has been a pioneer in numerous important different phases of the care of the teeth.

It standardized the shape and design of the tooth brush, and was the first to adopt the efficient three rows of bristles, and to drill a hole through the handle so that the brush may be hung on a hook.

It was the pioneer in the practice of putting each brush in a separate sanitary pasteboard box, and of thoroughly sterlizing each brush. It was the first to place an identifying mark on each, so that father could distinguish his tooth brush from mother's.

It was the first manufacturer in its field to advertise, and through its advertisements it has instructed the American people as to the correct method of brushing the teeth.

It was the first brush manufacturer to coöperate with the dental profession.

It was the first to put dental clinics and tooth brush drills into the public schools.

And it was the first manufacturer to sell a tooth brush with an absolute guaranty back of it.

Much of the machinery in use at the plant has been designed and manufactured there, the company having maintained an experimental department for many years.

A BRISTLE PLANT AT SHANGHAI

More than 200,000 pounds of bristles arrive at the Florence factory each year. In order to insure the finest quality and an uninterrupted supply, the company operates its own plant in Shanghai, China, where bristles are assembled, cleansed, packed and shipped to Florence, six hundred people being employed at Shanghai.

Russian bristles are received at Florence in enormous barrels, made of hand-split staves and hooks, and secured with hand-forged nails, between 700 to 800 pounds of bristles being packed in a barrel.

From the tropics the finest tiger ebony is received for hair brushes and mirrors, as the toilet set business constitutes an important part of the Pro-phy-lac-tic production.

During the World War the U. S. Government took over a solid six months' factory production of 3,000,000 of the company's brushes for its fighting men. Ever since Mark Twain mentioned the Pro-phy-lac-tic in his "Connecticut Yankee at the Court of King Arthur," celebrities as well as commoners have continued to demand the Florence products by name, and but a few years ago 120,000 public school children in America competed for the medals and prizes offered by the Pro-phy-lac-tic Brush Company for essays on the care of the teeth.

Perhaps there is some significance in the fact that the very site of the Florence "brush shop" was once that of a health resort, presided over by Dr. Munde, who operated a water cure which people from all parts of the United States sought—the same waters that today lap the sides of the Florence factory and turn the wheels of the Corticelli Mills a few feet away.

The Pro-phy-lac-tic Brush Company maintains offices in New York, Boston, Chicago, Montreal, San Francisco, Europe, Asia and Australia, and employs 600 hands at the Florence plant, and operates a branch manufacturing unit in Montreal.

There are now 208,000 square feet of floor space in the plant, whereas, in 1886, the original corporation occupied about 21,600 square feet.

J. Paul Boyle is president of the corporation, and F. C. Ely, secretary and treasurer; the above, with George H. Burr, George P. Dike, Eldon Macleod, and Fannie B. Look, constitute the board of directors. The corporation has a capital of $3,331,675.

THE NORTHAMPTON CUTLERY CO. AND THE FLORENCE CASKET CO.

The Northampton Cutlery Company was formed in 1871 and soon employed 250 workers, with an annual value of products of $500,000. Today, with more than half a century of history behind it, the concern ranks as one of the outstanding companies in its line in America, its famous stainless steel cutlery enjoying a world-wide distribution. It maintains salesrooms in New York and Chicago.

Capitalized for $100,000, it employs 150 operatives in the production of table cutlery of the highest quality. O. W. Edwards is president, Warren M. King, secretary, and S. L. Butler, treasurer.

In 1873 a group of Northampton citizens, desirous of setting up a new industry in the town, formed what was originally known as the Florence Furniture Company. The original articles of association indicate that it was a community project, as practically every leading citizen in the village of Florence subscribed for at least a small amount of stock and no one person took a large amount. The company prospered from the start, but had a slow growth. In 1914 William H. Bosworth assumed charge of its affairs, and four years later reorganized the concern as the Florence Casket Company.

Not long after it began operations it engaged in the manufacture of caskets for the dead. During the last few years it has so increased its business that it has become the second largest unit of its kind in New England. Under the administration of Mr. Bosworth the factory has been greatly enlarged.

Capitalized for $140,000, it employs upwards of 100 men and women. William H. Bosworth is president, and W. H. Bosworth, Jr., treasurer and secretary of the corporation.

The Florence Tack Company was established in 1874 for the manufacture of tacks and small nails. Fire destroyed the plant, which was rebuilt in 1877, but the company failed in 1892.

THE ORCUTT AND WILLIAMS ENTERPRISES

The Orcutt Wagon Works, manufacturers of drop center wagons, began business in Florence, in 1879, and removed to its present location in the center of Northampton, in 1907, occupying a building originally built for a button factory. The concern was the first in western Massachusetts to apply rubber tires to horse drawn vehicles, and up to the advent of the automobile it manufactured buggies and carriages. In 1906, it made for the Norwood Ice Company, the first automobile truck body ever fabricated or owned in Hampshire County, and applied it to a Knox automobile chassis.

The Williams Basket Manufacturing Company, which, in 1880, was the largest unit of its kind in the world, was formed in Huntington, in 1850, by L. B. Williams, who continued operations there until 1862, when he removed the business to Northampton.

At the outset he employed twenty hands and turned out 300 baskets

a day, but later these totals were increased to 150 workers and 5,000 baskets a day, a three-story factory being built, 40 by 210 feet, with an engine room, 30 by 70 feet. The present-day Williams Manufacturing Company has capital of $150,000 and employs 40 operatives. I. D. Moseley is president, and O. W. Edwards, treasurer, of the concern. which manufactures baskets and box shooks.

THE KINGSBURY BOX & PRINTING CO.

In 1880 the Northampton plant of the Kingsbury Box & Printing Co. was established, being an outgrowth of the unit set up in South Coventry, Conn., in 1868, for the manufacture of cartridge boxes. The concern also operates the Kingsbury Box & Printing Co., at Whitman, where it established a plant in 1889, manufacturing there shoe boxes only.

In 1911 it began the production of paper containers, at Northampton, under the name of New England Purity Paper Bottle Company, and in 1887, it established another branch plant, at New London, Conn., under the name of Brigham Paper Box Company.

Capitalized for $50,000 and employing 100 operatives, the concern is one of the leaders in the paper box field, in Massachusetts. Harold P. Kingsbury is president, Louis A. Kingsbury, treasurer, and James E. Stanley, secretary, of the corporation.

In 1892 the Crown Braid Company was established, and soon afterward the Hiram Wells Company was founded.

THE NORWOOD ENGINEERING CO.

In 1893 a group of citizens in the village of Florence organized the Norwood Engineering Company, beginning business in two small buildings, while today the plant covers approximately fifteen acres of space, and comprises a large foundry, where both iron and brass castings are made, and a fully equipped machine shop and an assembling plant maintained, the concern making a specialty of the designing, manufacturing and installing of water purification or filtration plants for towns and cities and for large manufacturing units such as paper and textile mills, dye works, and other industries where pure and clean water are essential to production. The company, which employs 200 operatives, also produces a complete line of paper mill machinery for finishing high-grade papers of the glassine, book, ledger and bond types, and it has installed filtration plants in upwards of 500 swimming pools in all parts of the United States.

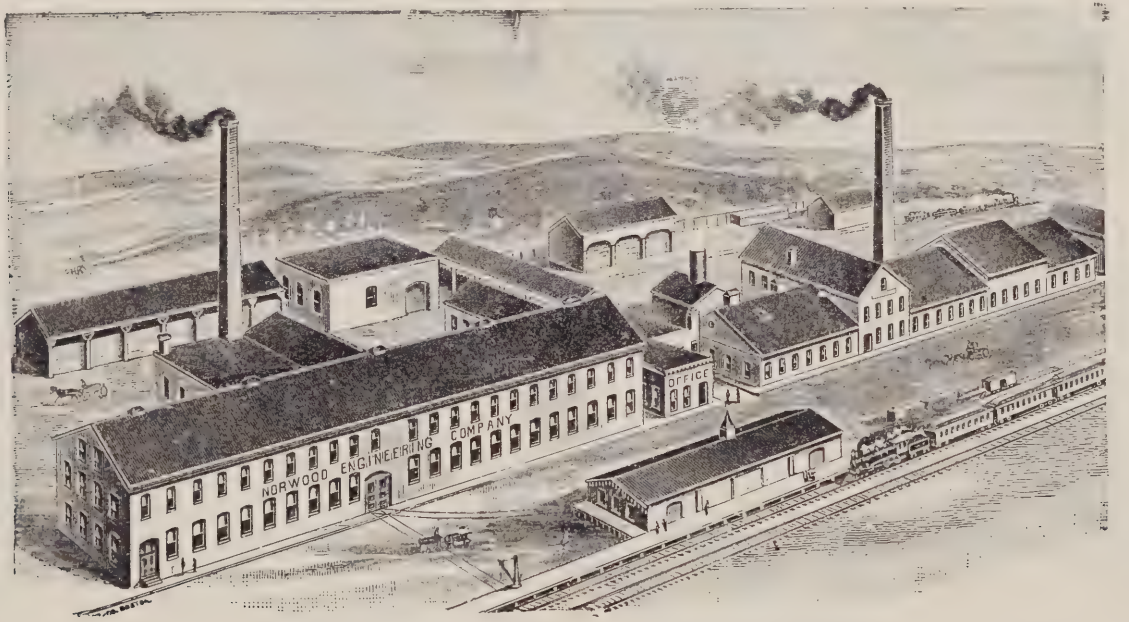
In 1917, upon the death of William Stevenson, the general manager of the concern, Howard W. Hosford, who had been identified with its progress for 16 years, was elected as his successor. The company had been incorporated in 1893, when it took over the defunct Arthur Hill machine plant, which consisted of two small buildings.

Five large modern structures were erected between 1901 and 1914, and the company's activities have been greatly extended during the past dozen years under the management of Mr. Hosford.

W. M. King is president, G. Wilson MacDow, treasurer, H. L. Perrin, secretary, and they, with H. W. Hosford, constitute the board of directors.

THE MCCALLUM HOSIERY CO.

The history of the silk hosiery industry in the United States is practically the story of the development of the McCallum Hosiery Company's business.



NORWOOD ENGINEERING COMPANY, FLORENCE



NORWOOD ENGINEERING COMPANY, FLORENCE

About forty-five years ago, Alexander McCallum began, in Holyoke, to experiment with the manufacture of full fashioned silk hosiery which, up to that time, had been made almost exclusively abroad. It was necessary to obtain skilled workers from England, France and Germany, as American knitters could not be secured.

The first machines knit but one stocking at a time and more of these stockings were imperfect than perfect. But Mr. McCallum persevered.

About thirty years ago, the industry was moved to Northampton and the first small mill built on the present site. This was equipped with electricity and what were then the best machines—knitting twelve stock-



THE FLORENCE UNIT OF THE McCALLUM HOSIERY COMPANY
Erected in 1910



MAIN PLANT OF McCALLUM HOSIERY COMPANY, NORTHAMPTON
The small unit at extreme right is the original mill

ings at a time. Later on, machines were installed knitting fourteen stockings at once, and now most of the machines employed knit twenty stockings at one time.

Many times since those early days, the company has been forced to increase its capacity. Beginning with the small mill in Northampton, the organization has grown steadily to its present size, with its main mill in Northampton increased in size and capacity many times larger than the original plant, and operating two plants in Florence, a suburb of Northampton, one in Philadelphia, and a small unit in Holyoke.

Early in 1925 an expansion program was started which is still in progress, the capacity of the three knitting mills having been greatly increased by the addition of many new machines.

By consistent programs of national advertising the name "McCallum" on hosiery has come to the considered a hallmark of fine quality. Every

pair of the company's stockings is manufactured in a McCallum-owned mill.

The concern employs upwards of 1,200 operatives. George B. McCallum is president and treasurer, and Oliver B. Bradley, secretary, of the corporation.

SOME OF THE NEWER INDUSTRIES

In 1903, the Chilson Auto Top Shop started in a modest way, large extensions being made in 1920 and 1922.

In 1904, Hiram W., and William H. Miller began the manufacture of store and bank fixtures, and house finish, in Northampton, and seven years later changed their policy and began the production of display cabinets for silk and cotton thread. Under normal conditions, Miller Brothers employ from forty to fifty hands.

The Howes Brick Company was incorporated in 1913, the plant occupied by it having been started by Patrick Gleason, twenty years before. It included seven acres of land, drying racks for 200,000 brick and burning sheds for 1,500,000. Today, the company owns thirty acres of land containing one of the finest clay banks in the East, and has drying racks for 400,000 brick and burning sheds capable of making 3,000,000 brick at a time. The clay bank is operated by a steam shovel and the raw material is run on cars over a narrow gauge railroad to the brick machine, which turns out brick at the rate of 100 per minute. Employing forty men, about 75 per cent of the 5,000,000 brick annually turned out at the plant are shipped by rail throughout New England and New York State. Wallace A. Howes is president, and Walter K. Howes, treasurer of the corporation.

In 1914 the Lane hand loom was first designed and constructed by Frank P. Lane, then principal and instructor in woodwork and weaving at the Hill Institute, in Florence, and two years later the Nuttleman Manufacturing Company was formed, and since that time has been engaged in producing the Lane product for hand weaving, together with many accessories that attend this process.

The Florence plant of the International Silver Company was purchased in 1920, and began operations the first of the following year. Originally equipped to turn out 21,600 blades per week, the mechanical installation now affords a capacity of more than double that figure. When the factory started all the blades were silver-plated, after the handles had been mounted, but in 1922 stainless steel was introduced into the product, and the demand for this type of goods has so increased that the Florence unit now manufactures only stainless steel blades. The raw material comes to the factory in long bars, and is then cut to length, forged, hardened, tempered, ground and polished, after which the blades are sent to the company's plants, in Connecticut, where the handles are mounted.

One hundred and twenty-five employees are carried on the company's payrolls, at Northampton.

In 1921 the Northampton Hosiery Company was incorporated, with capital of $225,000, and is engaged in the manufacture of women's full fashioned hosiery. Thirty employees are carried on the payroll.

C. K. Santer is president, and Paul A. Herbert, treasurer.

The Clement Manufacturing Company, with capital of $32,000, employs 100 operatives, in the manufacture of cutlery and knife blades,

Robert T. Lee being president and treasurer, and M. L. Collins, secretary, of the corporation.

Shovels are manufactured by the C. A. Maynard Co., Inc., fifty hands being employed. The concern has capital of $50,000, and is managed by Champion B. Swift, president, and Maynard Swift, treasurer.

One of the plants of the famous manufacturing house of William A. Rogers, Limited, is located in Northampton, where 150 operatives produce Rogers silverware and cutlery. This concern has capital of $2,622,800, and S. J. Moore is president, E. G. Baker, secretary, and R. E. Sage, treasurer.

The Northampton Iron Works, a partnership which includes Frank M. and Albert Bostley, manufactures iron castings.

The Pyro Febrin Company, owned by Charles B. Kingsley, produces proprietary medicines; and Pomeroy Bros., Inc., with capital of $30,000, is engaged in wood turning, F. S. Pomeroy being president and W. H. Hadley, vice president, of the corporation.

The Merrick Lumber Company, of Holyoke, operates one of its four Massachusetts units in the city; the Federal System of Bakeries, of Boston, has its Bay State factory in Northampton; the Springfield Dairy Systems, Inc., of Springfield, maintains one of its Massachusetts units in the city, and the Eastern Dairies Co., Inc., of Springfield, operates a unit in Northampton.

CHAPTER XXXII

THE INDUSTRIAL SET-UP OF THE TOWNS OF HAMPSHIRE COUNTY

The one hundred and thirty-two manufacturing concerns doing business in Hampshire County, in 1927, used stock and material valued at $23,295,901, paid wages of $10,393,679 to 9,830 men and women, who turned out products valued at $45,118,265.

The seventeen industries in the town of Easthampton outranked in the value of the commodities produced, the fifty-one manufacturing concerns of the City of Northampton, placing upon the market goods valued at $16,201,057, as against commodities manufactured in Northampton of the aggregate value of $16,154,246. The seventeen industries in Ware stood third, with products valued at $6,725,766; those in South Hadley came fourth, with a value of $3,175,689; those of Amherst, fifth, with a total value of $1,186,519, and those of Huntington, sixth, with a value of $810,784.

Nineteen industries located in seventeen other towns of the county produced manufactured goods valued at $864,204.

AMHERST—THE STRAW HAT TOWN

Amherst has two straw hat factories—George B. Burnett & Son, Inc., and the Hills Company.

The latter concern is one of the oldest hat producing hat units in the United States, having been started nearly a hundred years ago by Leonard M. Hills. Prior to the establishment of the Hills shop, palm leaf hats were made by hand by many families in Amherst, the leaf being sent to Boston from the West Indies, taken to Palmer by rail, and carried to Amherst by teams.

L. M. Hills and his son erected larger mills in 1856 and after they were carried away by floods in 1863, built a factory on the site now occupied by George B. Burnett & Son, Inc. On the death of L. M. Hills in 1872 the factory was purchased by H. D. Fearing under which name it operated until purchased in 1892 by the Burnetts.

The present Hills Company was incorporated in 1877 by Henry F. Hills who built a new factory. Both establishments burned in 1880 and both were rebuilt on the same sites.

The Burnett unit was incorporated in 1906, is capitalized for $500,000, and employs 250 hands at Amherst, and at Westboro, where it also operates a branch plant; E. J. Sears is president, and H. W. Burnett, treasurer, of the concern, and Fred H. Hawley is president, Ralph S. Tomkin vice president, and Dwight M. Billings, treasurer, of the Hills Company, which has capital of $60,000 and carries 250 operatives on its payroll.

In 1929 the word "Amherst" was painted on the roof of the company's plant, in letters 14 feet long, as a guide to airplane pilots, the work being done in compliance with the suggestions by the Guggenheim Aeronautical Foundation, and in accordance with the specifications of the United States Department of the Interior.

John S. Lane & Son, Inc., of Westfield, operates a branch crushed stone plant, in Amherst.

About 1849 Ira C. Hawkins began the manufacture of gold pens, in Amherst, and subsequently formed the Hawkins Gold Pen Company, with capital of $100,000.

The Amherst Manufacturing Company, formerly the Brown Mercerizing Company, removed to Amherst, from Holyoke, in 1910, when it was incorporated and is engaged in producing crochet and darning cotton, and in dyeing, bleaching and finishing. Mason A. Dickenson is president, Thomas H. Barden, Jr., vice president, and Thomas H. Barden, Sr., treasurer, of the company, which has capital of $30,500, and employs forty operatives.

The Knickerbocker Leather & Novelty Co. began business in the town in 1916, and four years later, the Springfield branch was consolidated with it, approximately 100 hands being employed in turning out 125,000 pieces of advertising novelties and bank specialties, each month.

The products go all over the country to such companies as the Bank of the United States, the North American Insurance Company, the large tire and rubber corporations, the Coca-Cola Co., and many others.

Morris Epstein, Saul Kowarsky and Emanuel Burstein constitute the partnership.

In the '60s, C. H. Bangs and G. E. Howes built a plant, at North Amherst, for the manufacture of tobacco boxes, doors, sash and blinds, which, in 1869, was bought by Graves, Kellogg & Howes, and, seven years later by Graves, Kellogg & Bangs. About 1880, a new plant was built by Dwight Graves & Co., which was taken over later by Robert Elder, who leased it to H. E. Holden, in 1919, who operates it at the present. Screens, apple boxes and card tables have since been added to the line.

The American Tissue Mills, of Holyoke, operates one of its three Massachusetts plants in North Amherst, where its wax paper products are manufactured.

BELCHERTOWN, CHESTERFIELD AND CUMMINGTON

The Belchertown Woolen Company, whose plant was located at Bardwell Village, in Belchertown, manufactured satinets for many years, and J. & S. Clark operated a successful mill for the production of wrapping paper. A shoddy factory was located at "Slab City," and numerous sawmills were established.

Back in the middle of the last century Belchertown was the Detroit of the carriage industry, and for many years the town stood at the head of the procession, and undoubtedly produced a greater number of single wagons than any other town in Massachusetts.

In 1855 the value of the annual local output of vehicles was $100,000, and eight establishments engaged in the manufacture of coaches, chaises, buggies, sleighs and carriages flourished at that period. They employed in the aggregate 166 men and turned out in 1885 vehicles to the number of 1,110.

Among the earlier shops were those of Jonathan and Simeon Bardwell, Mason Abbey, Harrison Holland. Later on H. & T. Filer & Co. employed fifty men. Seth D. Griggs carried as high as thirty on his payroll, and Joel Packard & Co. had forty employees. Other firms with smaller forces included Hawkins & Smith, Maynard Leach, T. J. S. Parsons, Stephen Packard, Nehemiah Smith, Burnett, Purdy and Chambers, Solomon Shumway, Park Holland, and others.

One of the best known firms was that of T. & S. D. Cowles, which shipped some of its famous products to Persia and Australia. Fifth Avenue stage coaches were produced in Belchertown in large numbers and Darius Cobb, the famous Boston artist, painted some of the panels for these vehicles, and for a time resided in Belchertown while filling his contracts.

The Boston Duck Company, whose mills are located at Bondsville, later erected another mill on the Belchertown side of the river.

Joseph Burnell built the first sawmill erected in Chesterfield, in 1761, the crank for the waterwheel being carried from Northampton on the back of a negro. Three generations of Burnells operated the plant, and cloth-dressing mills, corn-grinding factories, and a scythe-stone factory followed. During the '70s H. K. Weeks operated a cutlery shop and foundries and machine shops were set up, but all have disappeared.

BUILDING BETTER BASKETS

What has made New England famous in its long industrial career is typified in the reproduction of Ralph Waldo Emerson's classic, nailed over the door of a little basket shop in the hill country of West Chesterfield: "If a man write a better book, preach a better sermon, or make a better mouse trap than his neighbor, though he build his house in the woods, the world will make a beaten path to his door."

In the form of a country road, dipping and winding through the beautiful Berkshires, such a beaten path leads to the shop of Benjamin Higgins, which he inherited from his father, and where, with a pride in his handicraft, this Yankee basket-maker weaves baskets which have become so famous that he cannot supply the demands for his products, though he works far into the night.

So long ago did they become popular that he has abandoned selling them in wholesale lots to dealers, as he found the supply insufficient to care for the demands of the men and women who, having heard of the basket-maker of West Chesterfield, troop up to his little shop every day from early spring until the advent of winter.

The same spirit of having everything that goes out of his little factory of the finest possible quality is what has not only made the name of Benjamin Higgins stand for perfect workmanship with those who know the value of a good basket, but it is generally typical of New England-made products.

And in a corner of the Higgins shop we find the reason. There stands a stack of baskets which have become faintly spotted with mildew on their bases. They represent hours of patient labor, but they are not perfect, and Higgins will neither sell them nor give them away, because he is unwilling to have these known as his handiwork. "I can't afford it," he says. "I make the best baskets I know how to make; and every bit of work on them is done 'on honor.' I couldn't sell those baskets to my worst enemy."

In these few words one finds the answer to the never-ending procession of farmers who wind their way to the Higgins shop for sturdy bushel baskets for their fields; to the hordes of tourists who want special shaped baskets in which to place ferns or flowers gathered from the woodlands of the Bay State, or to the scores of housewives who are filled with disgust when they splinter their fingers on the handles of the average market-basket, or who catch the delicate silken threads of hose or underwear on

a cheap clothes hamper, and all of whom are anxious to buy the best basket that is made.

Higgins has woven baskets ever since he can remember. When a small boy he utilized the stock discarded by his father's workmen and he knows the business today, although but a young man, better than his sire before him. Like the painstaking craftsman of earlier eras, he performs every process himself. Until he received injuries in France, while in service during the World War, he even went into the woods and cut down the ash trees which provided the stock. Today, he contents himself with going into the forest and selecting the trees, permitting his assistants to fell them. He chooses young and thrifty specimens of from fifteen to twenty-five years' growth, which, when sawed into logs, 10 to 12 feet long, will show in the cross section grains outside the heart of the tree. These grains, each representing a year's growth when separated by the power hammer, make the smooth but tough strips from which Higgins weaves his baskets, and in this illustration one notes the reason why the little highway through the Berkshires has become the "beaten path" to the quality product that has made Benjamin Higgins famous.

In 1805, William Hubbard built a tannery at West Cummington which became the largest employer of labor of any industry that ever existed in the town.

In the late '70s the lower paper mill owned by F. A. Bates was employing twelve men in the manufacture of manila paper. The buildings were erected by Nelson Shaw & Co., in 1856, and the property had many owners. In 1879 the plant was producing 250,000 pounds of paper, including fine bond and writing paper in plain and fancy tints, the product being hauled to Adams, where it was finished.

A pen-holder factory, and a machine shop, existed in the decade between 1870 and 1880.

In 1874 Arlin V. Stevens removed to Cummington, from the town of Worthington, and upon the death of his father formed the Stevens Manufacturing Company, specializing in the manufacture of brush handles, turning out 200 gross a day. Mr. Stevens invented much of the machinery used in the plant. The concern is now operated by C. A. Stevens, who employs twenty-five operatives.

THE MANUFACTURES OF EASTHAMPTON

The grist- and sawmills of the pioneer days were followed by a fulling mill, a tannery, and by the weaving of "hard times" cloth during the depression of 1837, in which years the first power-loom was operated in Easthampton.

In 1847-8 Samuel Williston and Horatio Knight established the National Button Company, which by 1879 employed 200 operatives.

As early as 1848-49 the plant of the Nashawannuck Manufacturing Company was, built, in Easthampton, for the manufacture of elastic webbing, and in 1859, the Williston Mills were erected to manufacture cotton yarn.

THE EASTHAMPTON RUBBER THREAD CO.

In November, 1863, the Easthampton Rubber Thread Company was incorporated, with $100,000 capital, which has since been increased to $1,200,000. For years after its formation it consumed 250,000 pounds of pure rubber annually.

H. G. Knight was its first president and Seth Warner was the first treasurer and secretary. Enjoying prosperity it soon reached a position where it produced seven-eighths of all the rubber thread used in the United States.

In 1891, the present treasurer, William L. Pitcher, entered the employ of the company, and upon the death of his father, Franklin W. Pitcher, who had been general manager of the concern for many years, he succeeded to that position.

Today, the concern employs 100 operatives in the manufacture of rubber threads and bands. Robert L. Williston is president, William L. Pitcher, general manager, and O. B. Bradley, treasurer.

The Mt. Tom Thread Company came into existence in 1864 and in June, 1865, the Goodyear Elastic Fabrics Company was formed. The Valley Machine Company was established in 1868.

THE CONGRESS SHOE GAVE RISE TO THE ELASTIC WEB INDUSTRY

Little does the present generation realize that the small piece of elastic web inserted in the side of the old-fashioned Congress shoe and in the more modern Romeo and Juliet slipper, gave rise to the founding of the elastic web industry, with its great variety of elastics, braids and webbing which are a necessity of present-day civilization.

Prior to the accidental discovery by Charles Goodyear, of the process of vulcanizing rubber, the principal method employed in manufacturing boot webs before the introduction of vulcanized rubber thread into the weaving of goring, was to make the web with an alpaca face and a white calico back, which were stuck together.

The pieces of alpaca and calico were cut in long lengths of the width required, passed through a machine which spread a solution on one side, run over a large revolving wheel and dried in this manner. The dried pieces were then rolled and put through further rollers over a long bench. The rubber threads, passing through sleigh and solution, were laid automatically on the alpaca as the machine moved along. The operator of the machine laid the calico over the rubbers and alpaca, and formed the edges by turning the alpaca over with the thumb nail. Thus the finished web was formed. This type of web proved unsatisfactory and was soon superseded by the weaving method.

ORIGIN OF WOVEN ELASTIC WEB

It is difficult to say definitely who originated woven elastic web, but the demand for the Congress shoe, which had spread to America, from Germany, England and France, developed the necessity of providing some sort of a commodity that would take care of the situation.

In 1859 Edmund Sawyer, Samuel Williston, and Horatio G. Knight, the latter Lieutenant-Governor of Massachusetts from 1875 to 1879, built, in the village of Glendale, in the town of Easthampton, on the banks of the Manhan River, the first elastic web mill in America to manufacture shoe goring, and imported to this little hamlet, lying between Mount Tom, overlooking the majestic Connecticut River on the east, the Pomeroy Mountain on the west, looms from England. After their arrival, patterns were made from the English looms, and additional ones were manufactured for the concern at Clinton. But the operation of the English and Massachusetts-made looms proved difficult, as there were no experienced weavers at Glendale, and trouble immediately developed in

manufacturing goring that proved satisfactory. In 1861 Mr. Sawyer was sent to England to secure a competent weaver, familiar with the operation of the looms, and he brought back Thomas Turner, of Leicester, England, who, soon after his arrival at Easthampton, induced a group of elastic web weavers to come to this country, among them William and Thomas Martin, and Alfred Hopkins, who years afterward, established at Chealsea, elastic web factories of their own, now owned by Everlastick, Inc.

As the Glendale industry grew, weavers of other nationalities, including many Germans, came to Easthampton, and in 1863 the original plant was abandoned, and a new one was built in Easthampton proper, three miles distant from Glendale Village. The Glendale Elastic Fabric Company, now a part of the United Elastic Corporation, was incorporated that year.

The then new concern imported its rubber thread from England until the formation of the Easthampton Rubber Thread Company. Later the Revere Rubber Company, of Chelsea, was organized and engaged in the production of rubber thread, which afterwards was transferred to the Providence, Rhode Island, unit of the United States Rubber Company, after that corporation came into being in 1892.

THE GEO. S. COLTON ELASTIC WEB CO.

With the traditional barrel and a board over the top of it, serving as his office, George S. Colton, who had resigned as foreman of the finishing department of the Glendale Elastic Fabrics Company, in 1886, and with $5,000 capital, and the belief that there existed a field for the production of elastic webs, established the Geo. S. Colton Elastic Web Company, which, despite periods of adversity, grew steadily until by 1915 the total yearly sales approximated $320,000. Early in his manufacturing career, he counted as one of his steady customers, Frank W. Woolworth, the founder of the famous Woolworth chain stores.

In 1910 the Colton company was incorporated with capital of $300,000, and soon after that year Mr. Colton's health caused him considerable concern, and it became necessary to reorganize the corporation, the capital being reduced to $250,000 at that period—a sum insufficient to properly operate the business.

In 1916, Mr. Colton disposed of his entire holdings, representing the controlling interest in the corporation, to Clifford A. Richmond, then treasurer of the Glendale Elastic Fabrics Company. It is a somewhat strange coincidence that both Messrs. Colton and Richmond left the employ of the Glendale unit in their respective forty-first years—the former to found the company which bears his name, and the latter to realize what seemed to him then to be an exceptional business opportunity—a dream that has since come true.

A sincere believer in the theory of service to the world rather than mere success for oneself, Mr. Richmond proceeded to translate his policy into a practical working program that would build up the business. In a dozen years after he assumed the ownership of the corporation the sales rose to $1,250,000 annually, and the plant was tripled in size and equipment.

The company passed through the trying post-war deflation period of 1920-21 without a break in its dividend record, and without being forced to accept drastic inventory losses. In the last dozen years, two stock dividends and a stock split-up increased the capital to $500,000, and dur-

ing that period the company borrowed money but once, and that was the small sum of $20,000 for two months.

In 1927 the concern found itself in need of larger manufacturing facilities, and as Mr. Richmond had reached a point in life where he was anxious to be relieved of some of the managerial responsibilities, he favored the merger of his unit with the Glendale and Conant & Houghton companies, and the Easthampton Rubber Thread Company, into the United Elastic Corporation. He retained a substantial stock interest in the new company and remained as the executive in charge of the chain and variety store business and as manager of the Colton Division.

The latter unit specializes in direct service in elastic webs to upwards of 5,000 chain stores all over the country, and no insignificant proportion of its sales is carried on by direct mail, much of which is accomplished through a lively house organ, to which Mr. Richmond contributes all its contents.

In addition to elastic webs and braids, the Colton Division manufactures cords, artificial limb webbings, and aeroplane shock absorbers. The sales for 1928 showed an increase of twenty per cent over those of 1927. Upwards of 250 operatives are employed at the Colton plant.

THE UNITED ELASTIC CORPORATION

On October 1, 1927, an important merger of the Glendale Elastic Fabrics Company, the George S. Colton Elastic Web Company, the Easthampton Rubber Thread Company, and the Lowell and Littleton units of Conant Houghton & Co., Inc., under the name of United Elastic Corporation, was effected, and spelled stability in production, sales and employment. There was no flamboyant issue of stock in order to gain public support of the venture, the companies simply combining their own capitalizations and uniting their resources, with every prospect that advantages would flow from larger buying, increased sales, combined management and reduced overhead.

The product of the Easthampton Rubber Thread Company is largely used by the other four units, in fabricating goods for manufacturers, jobbers, department and chain stores. At the Glendale plant rubber and elastic bands are manufactured for jobbers and stationery concerns, while the George S. Colton Company produces elastic and webbing extensively for the chain store trade. Fabrics for use in women's wear are made in the Lowell and Littleton plants. Numerous plant improvements were effected in 1928, the dyeing department at the Glendale having been brought up-to-date that year.

Approximately 1,000 persons are now employed in the Easthampton plants and 300 in the Lowell and Littleton units.

Judge Edward L. Shaw of Northampton is president, William L. Pitcher of Easthampton is treasurer, and H. W. Conant, assistant treasurer, of the United Elastic Corporation. William Astill is in charge of the Glendale mill; C. A. Richmond is manager of the variety store business at the George S. Colton unit; Mr. Pitcher, at the Easthampton Rubber Thread Company plant, and George W. Astill, at the Lowell and Littleton units.

The Glendale Elastic Fabrics units has capital of $1,100,000, and employs 700 operatives, Edward L. Shaw being president, and William Astill, treasurer of that branch.

The history of the largest industry in Easthampton—the West Boylston

Manufacturing Company—which was incorporated in 1814—is carried in the chapter of this work devoted to the early cotton manufactures of the Commonwealth.

In 1905, the National Felt Company was established, with capital of $60,000, for the manufacture of shoe felts and toe caps, and today the plant is equipped with eight sets of cards, and complete dyeing and finishing departments. Fifty hands are employed. William M. Lovering is president, and George W. Read, treasurer and manager.

The Hampton Company was established in 1910, for the bleaching, mercerizing and dyeing of cotton yarns and piece goods. It manufactures rayon yarns. Thomas McConnell is president, R. B. King, secretary, and Robert K. McConnell, treasurer of the corporation.

The factory of the Berkshire-Divine Corporation, engaged in the production of roll covering, is located in Easthampton, the main office being in North Adams.

Dibble & Warner, owned by Robert W. Barnett, manufactures suspenders, belts and armbands.

The Philipp Manufacturing Company, with capital of $50,000, employs twenty-five operatives in the production of overhead tracks, metal covered fire doors and sash, underwriters' tin-clad doors, and sliding door hardware. Reinhard Philipp is president and treasurer.

One of the four Massachusetts plants of the Merrick Lumber Company is located in Easthampton.

ENFIELD, GOSHEN, GRANBY AND GREENWICH

As early as 1773 a tilthammer was erected in Enfield. The manufacture of a superior grade of whetstones from a fine-grained sandstone quarried in the vicinity, was the first local industry to engage the attention of a considerable group of residents. Potash works and distilleries, the tanneries of Thomas Cary and Tertius Walker, fulling mills, cloth-dressing factories and an oil mill followed. In 1812 a dam was built at the upper village, and a cotton-yarn factory was built, followed a few years later by the weaving of fabrics. In 1820 the plant was sold to D. and A. Smith. It was burned in 1836 and later rebuilt and in 1852 the Swift River Company took it over and engaged in the manufacture of woolens, this concern having been formed in 1821 by Alfred, David, Alvin and Edward Smith.

In 1816 Wyatt Barlow erected a dam half a mile below the cotton factory, where he built a plant for the production of satinets. Mills for the production of men's hats, scythes, hoes, axes, plows and saddles followed. In 1825 the Minot Manufacturing Company was incorporated with Eliher Lyman and Ichabod Pope as its principal sponsors. The production of cotton and wool cards was begun in the town early in the nineteenth century, and was carried on until 1851, when operations were transferred to Holyoke.

In 1876 steel type for typewriters was extensively produced by Anson M. Howard, who took rank as a prolific inventor of commodities and machinery.

More than a century and a half ago sawmills were located on Dresser Brook, in Goshen, followed by a broom handle factory, and still later by an extensive button-mold shop which was carried on by C. C. Dresser. Saw and grist mills were operated on Swift River, and tanneries existed in the town at one period.

The waters of Bachelor's Brook, in Granby, furnished power for a few sawmills, a woolen factory and a small paper mill, in the long ago, and Elijah Kent operated an iron forge in the easterly part of the town at an early date. About 1812 there were four distilleries, each using 40 bushels of grain every week day.

In the last century scythe factories, a pewter button shop, woolen, saw and grist mills, and the manufacture of straw hats provided the industrial activities of Greenwich.

THE MANUFACTURE OF BROOMS, IN HADLEY

Records found in a diary in North Hadley show conclusively that Benjamin Franklin, in addition to his experiments in primitive electricity, introduced the broom to America.

The diary relates that a woman acquaintance of the author of Poor Richard's Almanak sent him from India a whisk-broom, with broom-corn seeds on the stalks, and that Franklin planted the seed, dealt out the stalks that grew from the planting, and made round brooms by winding thread around several stalks.

At the annual meeting of the National Broom Manufacturers Association, held in December, 1928, in Chicago, formal, but somewhat belated, credit was given to Franklin for introducing the broom into this country.

It is an established historical fact that broom corn was first raised, and brooms first manufactured in this country, for commercial purposes, in Hadley.

Rev. Enoch Hale, of Northampton, wrote in his diary, on May 19, 1785, that he "sowed broom corn," and a few hills may have been planted in Hampshire County gardens before 1797, but Levi Dickinson, of Hadley, is entitled to the credit of conceiving the plan of raising broom corn in abundance, and of supplying the housewives of this country with brooms.

It was in 1797 that he planted the first seed on his farm, and the following year he raised "the first half acre cultivated for brooms in America," thus establishing a business which exceeded in extent all local enterprises during a considerable period of the nineteenth century.

Dickinson was a native of Wethersfield, Connecticut, and when, in 1799, he increased his planting of broom corn seed to an acre, strangers who passed his garden, located on the upper part of the old back-street, in Hadley, and observed the tall product putting forth its panticles, stopped to make inquiries. In 1797 he fashioned between twenty and thirty brooms, and the next year he manufactured nearly 200. He employed Heber, a negro, to tie the brooms, but soon he evolved a method whereby the operator sat in a chair, with the twine on a roll under his feet, the brush being wound in the lap of the maker.

At the outset the seed was scraped by using a knife, and next a hoe, with a short handle fastened to a bench, was employed. Upright teeth were used later to separate the seed from the brush.

Dickinson peddled his brooms in a cart in Williamsburg, Ashfield and Conway, in 1798, and the following year his route was extended to Pittsfield, and about 1800 to New London, Connecticut. From the start of the business, most of his fellow-townsmen believed Dickinson to be visionary and his projects fanciful. Sneers were observed and sarcastic remarks were heard on every hand, while his Wethersfield friends tauntingly said

"The Indians hereabouts make brooms." While he met with obstacles and unpleasant occurrences, he was not diverted from his course, and being a man of energy and perseverance, though of little financial means and infirm in health, he boldly predicted to the scoffers, as early as 1801, that the broom business ultimately would become the largest industry in Hampshire County, a prediction that came true in after years.

Observing that he appeared to be making money, some of his neighbors, including William Shipman, Solomon Cook and Levi Gale, planted broom corn, in 1801, and Cato, another local negro, utilized some meadow land for the same purpose, the year before.

About 1805, Dickinson took loads of brooms on the road as far as Boston and Albany.

He produced his own handles, and spun the twine used in binding the brooms from the flax which he raised.

The raising of broom corn soon spread to Hatfield, Whately and Northampton, and the manufacture of brooms was begun in these localities a few years later.

The census of 1810 showed that 70,000 brooms were produced in Hampshire County, that year, and long before the death of Levi Dickinson, in 1843, at the age of 88 years, the broom manufacturing industry had become firmly established in the county.

By 1850 the local census showed that 769,700 brooms, valued at $118,478, and 76,000 brushes, valued at $5,970, had been produced by forty-one local manufacturers, that year, and that 496 tons of broom brush, which cost $72,745, or about 7 1-3 cents per pound, had been used. The handles, wire, twine, paint and varnish cost $15,274, or nearly two cents per broom. Five years later the assessors of Hadley, reported that 906 acres of broom corn were under cultivation, yielding an average of 700 pounds per acre, which at ten cents per pound, indicated a value of $63,420, while 60 bushels of seed per acre, worth 40 cents a bushel, or $21,744, were raised. That year the production of brooms in the town was 641,120, valued at $118,500, and 35,000 brushes, worth $2,645.

At present there is but one broom factory in Hadley, that belonging to Homer Francis Cook, which handles the small quantity of broom corn produced locally. The firm of Charles Cook & Sons, of which he is the owner, was founded by the late Charles Cook, in 1850; about twenty hands are now employed at the Cook factory in producing corn and whisk brooms.

Tobacco and onions have replaced broom corn on the river farms at Hadley, Hatfield and Northampton, the latter product having migrated to the west in its search for cheaper land. From the Connecticut Valley it first went to the Mohawk Valley, in New York State, and today the greatest center for the manufacture of brooms is located in Amsterdam. Then the raising of broom corn treked westward, through Ohio, Indiana, and Illinois, and the latter state today grows some of the best quality product, but in a much reduced tonnage as compared to former years. The bulk of the crop now comes from Kansas, Oklahoma, Texas and New Mexico, with Oklahoma leading in tonnage.

Certain types of broom corn are peculiarly adapted to dry farming, making it a valuable cash crop in the semi-arid sections of these states. From the day of the birth of the industry, in Hadley, in 1797, the manufacture of brooms has expanded until today it is carried on in every state in this country and to some extent in Canada.

THE PRODUCTION OF BROOM TOOLS

Caleb D. Dickinson, a village blacksmith, was the founder of the broom tool business of the United States, acquiring in his early teens the peculiar ability or knack of forging, hardening and tempering steel, with the result that the broom manufacturers of the period turned to him for the tools necessary to carry on their business. Prior to 1840, Mr. Dickinson divided his time between general blacksmithing and the making of broom tools, but in that year the demand for the latter was so constant that he set up his factory, in the north part of Hadley, on a water power privilege on Mill River. He continued the business until 1870 when his son-in-law, John C. Howe, became a partner, and the firms became known as C. D. Dickinson & Son, under which derivation it operates today. Howe was of exceptional mechanical ability, a descendent of Elias Howe, of Spencer, inventor of the sewing machine, and for 25 years he steadily adhered to the principles of tempering steel as practiced by Mr. Dickinson. The business is now owned by his son, Arthur C. Howe, who carries it on at the original site and the broom tools produced at North Hadley are marketed in nearly every state in the Union, and are exported to Cuba, the South American republics, New Zealand and South Africa. Today, bread, meat, apple, and potato knives are also produced at the North Hadley plant.

FROM PISTOLS TO FARMING IMPLEMENTS

The prophecy of the ancient seer that "they shall beat their swords into plowshares and their spears into pruning hooks" is literally being realized with impressiveness in the little town of Hatfield where the formerly idle Shattuck gun and pistol factory has been changed over to the manufacture of farm implements by the Hampshire Implement Company. Beginning on a small scale, the business has gradually increased and now it is an up-to-date going concern, distributing its products to farms covering perhaps half of the United States.

The progressiveness of the company is evidenced by the fact that it maintains a research department for the purpose of making improvements on existing machines.

A few years ago the Belcher & Taylor Co., of Chicopee Falls, engaged in the manufacture of farm implements, went out of business, and it was in 1912 that Herbert D. Smith, a dealer in grain and farming tools, and the late Hugh McLeod, a manufacturer of engine lathes, pooled their capital, and took over the patent rights to the Stevens fertilizer sower and other implements designed for the cultivation of the soil, and opened up the factory, in Hatfield, where guns and pistols had been manufactured in the days of yore.

Following the death of Mr. McLeod, early in 1927, his interest in the company was purchased by John McHugh, who became treasurer of the corporation.

For years the Porter & McLeod Tool Company, Inc., has been engaged in manufacturing engine lathes, in Hatfield, seventy-five employees being carried on the payroll of the concern, at the present time.

In 1929 the concern developed and introduced to the trade a mirror-finishing machine of its own design, for the use of cutlery manufacturers. The device produces finish on stainless steel knives and other stainless steel ware and introduces economies and rapidity of production by sup-

planting the method of hand-finishing which has generally been in vogue hitherto.

Twelve ordinary steel knives are polished and finished at one time by the invention. The knives are run between two rolls of felt discs operating at 3,500 revolutions per minute, and the machine is so designed that the knives are drawn between the felts up to the neck. At the same time an oscillating motion puts the high mirror finish on the product. Each roll is driven by an individual motor, while a third motor drives the feeding mechanism. All shafts are mounted on Timken bearings and all the working parts except the rolls are completely inclosed by the cabinet base. The machine occupies a floor space of 43½ by 34 inches, and the height to the center of the knife holder is 36 inches.

The use of stainless steel has come to fill such a large place in tableware and has been such a revolutionary factor in the cutlery industry that the demand for new improvements in production has been strong and the new product of Porter-McLeod has awakened keen interest among the cutlery men.

During the last four years this old-established concern has specialized in the manufacture of special machines in addition to its line of standard lathes for factory use. Among the outstanding products in this line of special machines is a roll-turning lathe for textile manufacturers, which is employed for turning the copper rolls used in printing cloth. The design is etched on the roll and when the pattern becomes obsolete it is removed by this new type of lathe, so that a new design can be etched on. The machine operates at high speed, being equipped throughout with Timken bearings and it is said to do its work twice as fast as the device it is designed to replace.

The company also is redesigning its entire line of lathes and expects soon to have on the market a new line of production lathes ranging in swing from 13 to 21 inches. These machines will be of the geared-head type, arranged for individual motor drive.

The main factory of the company is devoted to the production of lathes and the Shattuck plant, formerly occupied by the C. S. Shattuck Arms Company, and bought by the Porter Company in 1924, is given over to the production of special machinery. Both plants are operated by water, about 450 horse-power being developed at the site.

The Porter Machine Works were founded in 1878 by Jonathan E. Porter of Hatfield, who began the manufacture of engine lathes in a small way with a very small force. He continued the business until 1895 when Hugh McLeod, superintendent of the plant, was taken into partnership and upon the death of the founder, in July, 1921, the sole ownership became lodged in Mr. McLeod.

The business has shown a steady growth from the first. Beginning with ten men, the force was gradually increased and during the World War 90 men were employed. Following the armistice, due to a surplus of machine tools, business was curtailed to some extent, but during the past four years it has shown a gradual increase.

In the first years of the enterprise all of the output was sold in New England, but in recent times the product has been distributed throughout the United States and today a good foreign business is enjoyed as well. Several plant extensions have been made in recent years.

Following the death of Mr. McLeod, the business was incorporated under the name of the Porter-McLeod Machine Tool Company, Inc. H. L. McLeod is president and treasurer, D. P. McLeod, vice president; F.

W. Lovett, sales and office manager, and Aurin Wood, designing engineer and factory manager. Mr. Lovett has been associated with the company since 1914. Mr. Wood was superintendent of the factory from 1907 to 1915, when he resigned to become the superintendent of the Whitcomb-Blaisdell Machine Tool Company, of Worcester. In 1917 he was in the service of the U. S. Government as superintendent of the ordnance machine shop of the Osgood-Bradley Car Company, of Worcester. He held this position until the government ceased operation of the plant, early in 1919. He was associated with the Chevrolet Motor Company, of Flint, Michigan, as production superintendent, from 1919 until 1928, and in the latter year he became associated with Brown & Sharpe Manufacturing Company, of Provincetown, where he served on the planning board of that corporation until he resigned to become designing engineer and factory manager of the Porter-McLeod Machine Tool Company, Inc.

The Webster Box Company, owned by J. L. and M. W. Webster, operates a wooden box factory at West Hatfield, and another in East Hartford, Connecticut.

THE MANUFACTURES OF HUNTINGTON

Saw and grist mills were set up on one of the tributaries of Manhan River, on Roaring Brook and on the east branch of the Westfield River, in Huntington, in the early days. Another was built at Knightsville, in 1830, and ten years later Porter Knight turned his sawmill into a woodworking shop where turning was done. At Norwich Hill a tannery was established and an axe-making factory flourished there from 1815 to 1825, which was moved to Huntington Village, in 1846.

In 1852 O. H. Greenleaf and Lewis H. Taylor built a paper mill in Huntington Village, which at the outset manufactured newsprint paper, and later produced fine writing paper, having a capacity of one and a half tons per day. Later this plant was merged with the Massasoit Paper Co. of Springfield.

Huntington's first water wheel was used to propel a bark-mill at a local tannery. From 1830 to 1840 a cotton factory flourished, its owners later changing it to a plane manufactory. The woolen mills of Messrs. Little and Slater operated until the plants were twice put out of commission by fires. In 1875 W. P. Williams located an edged tool factory at the mouth of Butolph Brook.

Bedsteads were locally manufactured at one period from the hard maple timber forests in the vicinity, and production was carried on at the site of what today is the Huntington Manufacturing Company, Department of William M. Lovering & Co., Inc., of Taunton. Still later, jacquard bedspreads were made here until finally the mill was burned.

In 1870 a stock company built the Highland Mills on this location and manufactured robes and cotton flannels, and later woolen goods were produced there up to 1908.

That year the buildings were purchased by William M. Lovering, of Taunton, who operated the factory as a worsted weaving and finishing plant, until the summer of 1929, producing mainly high-grade fancy men's wear worsted cloth, and women's wear and automobile upholstery fabrics.

The company was incorporated in 1923, with capital of $225,000, and the plant was equipped with 86 broad looms and 392 twist spindles, and complete dyeing and finishing departments, 160 hands being employed, at

the time operations ceased there. Subsequently citizens of Huntington raised a fund and took over the idle plant and it is now being operated.

The Chapin & Gould Paper Co., of Springfield, has its manufacturing plant in Huntington, where 120 operatives are employed. This concern has capital of $200,000 and enjoys the unique distinction of having had in its early days, as one of its principal sponsors and stockholders, Cyrus W. Field, the promoter of the Atlantic Cable.

Charles L. Chapin is president and treasurer, and Harold W. Hixon, assistant treasurer and secretary.

Henry E. Stanton employed thirty operatives in the manufacture of box shooks, until his sawmill was destroyed by fire early in the spring of 1929. Albert Smith rebuilt the plant and is now operating it.

MIDDLEFIELD, PELHAM AND PLAINFIELD

In 1814, William D. Blush erected a brick woolen mill in Middlefield, which was operated until 1850, when it was destroyed by fire.

Amasa Blush, who bought the Herrick Mill and Uriah Church, Jr., who later established a factory, were the principal manufacturers of the town, during the nineteenth century, their woolen mills prospering until 1874, when the great Williamsburg flood destroyed the plants.

In 1845, John Mann erected a large paper mill at Bancroft, or Middlefield Station, and produced wrapping paper. Today, the plant is owned by the Union Mill, with capital of $48,000, and twenty-five operatives are employed in producing paper wadding. Jonathan Bulkley is president, Franklin A. Stone, treasurer, and S. B. Moore, secretary.

Six years later Buckley Brothers built another mill there for the manufacture of wall paper.

Beginning in 1853, a group of New York men invested $300,000 in quarrying soap-stone from the mines in the northeast part of the town, and shipments of 100 tons a week were regularly made, while twenty men were employed.

The Montague City Rod Company produces split bamboo fishing rods in its plant in the town of Pelham, where sixty employees find steady work. Three-quarters of the supply of this type of rods used in the world are made by this corporation. The bamboo is bought in China by the company's importing agents, who ship it to Boston, whence it is taken to Pelham, and to the Vermont unit, these two branch plants fabricating only the rods.

Quantities of Pelham granite were quarried in both the eastern and western parts of the town during the nineteenth century, and forty-five years ago asbestos was liberally mined in the southwestern section of Pelham. Saw, grist and fulling mills were operated for a time, and George Macomber engaged in the manufacture of clothing. Bedsteads and hardwood articles were also locally produced and about 1830 wagons and carriages were manufactured in the town, the business later being moved to Belchertown.

Included in Plainfield's pioneer industries were Thomas Shaw's grist mill built prior to 1800, and which was operated until 1826; the satinet factory of Warner, Whiting & Co., the buildings being removed before 1860; the broom handle factory owned by John White; the type foundry operated by Homer Hallock, where type was made for printing the Bible in Arabic, and numerous tanneries, distilleries and satinet factories.

The industrial growth of South Hadley began with three sawmills in

1771, all located at the falls. Distilleries, potash works, grist mills, a cotton factory, paper mills and button shops followed, the Morgan Nail Works being established in 1812 and a salt grinding mill, in 1824.

THE CAREW MANUFACTURING CO.

The Carew Manufacturing Company was established at South Hadley Falls, on June 19, 1848, by Joseph Carew, with $35,000 capital. He became president and agent and following the destruction of the original plant by fire in 1873, a new mill was erected. When the concern was acquired in 1880 by John H. Southworth, one of the leaders in the paper industry of the Connecticut Valley, it was turning out daily 3,000 pounds of fine grade writing paper. Mr. Southworth introduced many advanced methods, remodeled the plant, and installed new machinery.

As early as 1853 the company had attained high rank in the paper production field, the commissioners of the World's Fair, held in New York, that year, awarding the first premium to the Carew concern on its papers, much to the surprise of English manufacturers, and with the result that a commission from England soon afterwards visited the mill to witness the process of manufacture of machine-made paper that had beaten their hand-made product. In 1906, upon the death of Charles H. Southworth, who had succeeded his father as the head of the concern, William D. Judd, who had been in charge of sales, became president, which position he holds today. The company also has as its vice president and clerk, Courtlandt B. Griffin, a son of Solomon B. Griffin, and a grandson of John H. Southworth, and George E. Bardwell, who was sales manager for twenty years, as its treasurer. The concern employs 175 operatives.

THE HAMPSHIRE PAPER CO. STARTED IN THE STIRRING SIXTIES

The mill it occupies was built in 1864, by the defunct Glasgow Company, which had produced army cloth, ginghams, etc., and which essayed to add paper making to its other activities during the Civil War period.



HAMPSHIRE PAPER COMPANY, SOUTH HADLEY FALLS

The new venture was not a success, and in 1866 the plant was sold to the Hampshire Paper Company.

It was under the leadership of the latter that the company decided to specialize on one product, and began to advertise Old Hampshire Bond in national magazines, a policy that was inaugurated long before other paper manufacturers recognized the advantages of well considered publicity and one that has been continued to the present. The wisdom of this step was early proven by the increasing demand for Hampshire products.

The company is also credited with being one of the first mills to establish resale prices on its papers, a sales policy which today is followed by nearly all making proprietary or mill water-marked lines.

Associated with President William D. Judd, who succeeded the late Charles H. Southworth, is Constant Southworth, the treasurer, son of Charles H., and grandson of the founder. The company has capital of $200,000 and employs 150 operatives and produces bond paper exclusively.

In 1903, the Hadley Mills were reorganized and succeeded the old Glasgow Mills, C. Fayette Smith becoming president, and Charles W. Dennett, vice president and general manager, the concern engaging in the manufacture of men's wear and dress goods, and now employing upwards of 250 hands. Harlan I. Dennett, son of Charles W., succeeded to the offices of vice president and general manager in 1922. Mr. Smith is president and treasurer of the corporation, and John W. Fullerton, clerk. The company is capitalized for $450,000. C. Fayette Smith is president and treasurer, and John W. Fullerton is clerk.

The Holyoke Paper Products Company, with capital of $100,000, employs forty operatives at its South Hadley Falls plant, where gummed and fancy papers and sealing tape are manufactured. Martin J. Judge is president, N. P. Avery, secretary, and Gerald A. Judge, treasurer.

One of the three plants of the American Tissue Mills of Holyoke is located in South Hadley, and a branch of the Eureka Blank Book Company, of Holyoke, is also operated there.

The Hampshire Brick Company, of Holyoke, maintains one of its yards in the town.

The Lynch Brothers Brick Company, of Holyoke, has its plant in South Hadley Falls, where about 100 operatives are employed.

In 1809 mining operations, which had been suspended by the Revolution, were resumed in the lead mines of the town of Southampton, by Perkins Nichols, of Boston, and were continued by David Hinckly and others, until 1828, when operations ceased, to be resumed in 1852, by Messrs. Stearns and Sturgess.

In 1894, Herbert B. Lyman began the manufacture of sheet metal in a building containing 480 square feet of space, and today he utilizes over 10,000 square feet in his operations, at Southampton.

THE INDUSTRIES OF WARE

The 70-foot head or "fall" in the waters of the Ware River, at Ware, in as many rods, early attracted the attention of those who saw the advantage of this free "white coal" and as early as 1739, Capt. Jabez Olmstead, of Brookfield, built two mills on the stream, and when his heirs sold these factories to Isaac Magoon the latter erected saw and grist mills. In 1813 Alpheus Demond and Col. Thomas Denny bought the property and built a new dam in the center of the falls, erected a carding mill and also

began the manufacture of machinery. In 1814 a cotton mill was built there. In 1821 the Demond and Denny holdings passed to Holbrook & Dexter, of Boston, who incorporated the Ware Company, with $600,000 capital, and built a large woolen mill, which was destroyed by fire in 1824, but was rebuilt.

In 1829 the Hampshire Manufacturing Company was incorporated with $400,000 capital, and bought all of the property owned by the Ware Company. In 1836 the woolen mills were greatly enlarged, but the financial panic of the following year proved the nemesis of the concern.

THE OTIS COMPANY

In 1839 the Otis Company was organized with capital of $350,000 and bought all of the property of the Hampshire Corporation, increasing its capitalization to $500,000 two years later, when it was incorporated. New buildings were erected in 1845, 1856-57, and in 1869. In 1864 knitting machines were installed for the manufacture of men's hosiery and men's underwear, and by 1879 the Otis Company had 26,568 spindles, seventy-six looms and seventy-five knitting machines, and the concern was turning out in addition to hosiery and underwear, 600,000 yards of denims, stripes, tickings, and fancy duckings, annually, and was using 2,500,000 pounds of cotton a year, while 1,100 hands were employed, to whom were paid $25,000 monthly.

It requires no Ponce de Leon in search of a perpetual fountain of youth, nor necromancy of the Houdini variety, to prove that a nonogenarian cotton textile concern can "come back" even when it totters on the brink of financial disaster.

In 1926 the Otis Company, with an unbroken dividend record extending over three-quarters of a century, found itself with a floating debt of $4,000,000, and its future outlook so uncertain that its stockholders met to decide whether or not the directors should be empowered, as they had suggested, to liquidate its Massachusetts plants, and remove to the South. Forming the chief industry of a town of 8,500 souls, and employing when operating at capacity 1,800 men and women, it was indeed a cataclysm that seemed to face the citizens of Ware when a majority of the directors asked authority to sell the 73,000 spindle unit there, as well as one at Greenville, N. H., with 19,000 additional spindles, and to erect a 10,000 spindle mill in the South.

After due consideration, the proposal was rejected; a reorganization was undertaken by which the capital was fixed at $4,000,000, in lieu of the original $800,000; the underwear department, once a part of the Ware unit, involving one mill and a considerable quantity of knitting machinery, was sold to the Ware Valley Manufacturing Company, which concern now operates it; while of the nearly 20,000 spindles formerly employed in spinning thread for the underwear unit, some 10,000 were sold for junk and the remainder were distributed among the other units of the Otis Company. With the proceeds of the sale of the Ware underwear plant, and those accruing from liquidation of inventory and machinery, the concern wiped out all its bank loans, which at their peak in the spring of 1926 totaled $4,000,000.

The management effected many operating economies, tax valuations were reduced in Ware (partly due to the sale of the underwear mill), and the local tax rate was reduced so that the company's annual municipal tax fell from $85,000,000 to $35,000, while valuations were also reduced

in other towns where the company operates plants. Wages were adjusted involving a saving in labor costs of approximately 10 per cent, the employees giving whole-hearted coöperation to the company's determination to remain in the North, a new selling arrangement was effected, the company doing much of its business on contract, and the machinery was brought up-to-date.

The story of this transformation proved stimulating to some faint-hearted New England mill treasurers, and it gave positive evidence that with competent management, cotton manufacturing can still be profitably conducted in the Bay State—even on heavy goods such as the concern produces, and that type which the South is considered to hold to the greatest advantage. For the year to September 30, 1927, the company reported net profits of $410,405, against a net loss of $649,986 in the 1926 fiscal year.

At present the Otis Company has 136,000 spindles in four mills, with 47,000 at Ware, as against 73,000 formerly. Awning material, pin checks, and other heavy goods are still being produced at Ware. The Greenville plant is operating on denims. The 44,000 spindle plant at Three Rivers, in Palmer is producing automobile fabrics and fancy and specialty goods, all of heavy types. The 26,000 spindle plant, at Bondsville, in Palmer, is turning out flannels, ducks and specialties.

The recently organized underwear company is now employing 400 operatives, and is making a determined effort to win the market by a deliberate and intensive emphasis on style trends.

In 1926, the Otis Company purchased the plants and assets of the Boston Duck Company and the Bondsville Bleachery and Dye Works, both located in the village of Bondsville, in Palmer, and also the plants of the Columbian Manufacturing Company at Greenville, and New Ipswich, N. H. In 1927 the Otis Company sold one building and its underwear business in Ware, and it is now operating the Ware Mills, in Ware, the Palmer Mills, at Three Rivers, in Palmer, the Boston Duck Mills and the Bondsville Bleachery & Dye Works, both in Bondsville, in Palmer, and the Columbian Mills, in Greenville and New Ipswich, N. H., all of which plants it owns outright.

The corporation has capital of $4,479,000. When operating at capacity the Ware plant employs 2,200 to 2,300 men and women.

The present officers of the reorganized company are: president, Isaiah R. Clark; vice president, E. Sohier Welch; treasurer, Henry G. Nichols; assistant treasurer, C. B. Nichols; clerk, William H. Montgomery.

THE GEORGE H. GILBERT MANUFACTURING COMPANY

In 1841, George H. Gilbert and Charles A. Stevens purchased from the Hampshire Manufacturing Company that portion of their property located on the south bank of the Ware River and formed the partnership of Gilbert & Stevens, which was dissolved ten years later, when this property was divided, Mr. Gilbert taking the stone mill, which had been built in 1846, and Mr. Stevens continuing business in the old mill. In 1857 Gilbert gave his nephew, Louis N. Gilbert, an interest in the business and the firm of George H. Gilbert & Co., was formed. Three years later land was purchased in Hardwick where the village of Gilbertville is now located, and a second plant was built there. In 1867 the firm became the George H. Gilbert Manufacturing Company with capital of $250,000, which was increased to $600,000 in 1883, and to $1,000,000 in 1886.

From a small beginning in 1857 the corporation has grown until now it occupies two plants with 476 looms, 13 sets of worsted cards and 28 sets of woolen cards, and employs at Ware and Gilbertville, between 1,000 and 1,100 hands in the manufacture of woolens and worsteds for men's wear.

The officers are John H. Neff, president, Charles B. Wetherby, vice president and J. H. Grenville Gilbert, treasurer, the latter being a son of George H. Gilbert.

THE H. P. CUMMINGS CONSTRUCTION COMPANY

In 1879, Herbert P. Cummings established the H. P. Cummings Construction Company, and in 1906 the concern was incorporated under that name. For more than fifty years this unit has erected many of the principal mills, hospitals, college buildings, private and preparatory schools, hotels, banks, office buildings, libraries, bridges, highways, state institutions, water systems, dams, churches, athletic plants and hundreds of residences, that have been built throughout the six New England states, including fifteen buildings at the Indian Orchard plant of The Fiberloid Corporation, the Lever Brothers factory, in Cambridge, several of the larger units of the Ludlow Manufacturing Associates, including its 247 foot chimney, numerous plants of the International Paper Company, in New England, as well as in New York State, and some of the largest hydro-electric developments in this section of the country.

Herbert P. Cummings is president, L. H. Cummings, vice president, and B. V. Davis, treasurer.

THE WARE COUPLING & NIPPLE CO.

The Ware Coupling & Nipple Co., whose products are largely used by the building trades throughout the United States, and in foreign countries, was founded by Henry T. Merriam, in Springfield, in 1908, under the name of the Grip Coupling Company and carried on operations there for two years, removing in 1910, to Ware. At the outset, production was confined to a patented malleable iron coupling for water, oil, and gas pipes, a device for connecting pipes without threads,—and with only a pair of wrenches for tools it gained favor because of the economy and speed afforded, and especially for instant repair work. Later, a broader line of fittings was developed, and with the assistance of Ware capital a one-story building, 50 by 35 feet was erected, which six years later was followed by a two-story structure, 100 by 35 feet. In 1916, the manufacture of pipe nipples of various lengths was undertaken, and has been so developed as to become the major line of production, more than 250,000 nipples having been turned out each month for several years past, in brass, iron, and copper, and in some instances plated with chromium and nickel over brass. The concern now markets its goods throughout the United States, Canada and Mexico.

Henry K. Hyde is president, D. W. Howe, treasurer and manager and L. H. Moore, secretary and superintendent, of the corporation, which has capital of $75,000.

The Ware Woolen Company was incorporated in 1919, with capital of $100,000, and is engaged in producing flannels and woolen dress fabrics. The plant is equipped with complete dyeing and finishing departments, five sets of cards, 128 broad looms, 8,320 worsted spindles, four pickers, four boilers and two water wheels, and employs 200 operatives on full time.

Fulton Rindge is president and agent, Wellington Rindge, secretary, and George B. Tarbox, treasurer.

In 1922, the Ironside Foundry, Inc., was established for the manufacture of grey iron castings. The concern is capitalized for $50,000 and employs 75 operatives, its growth within recent years having been marked. Additional buildings were erected in 1929 and the force was doubled that year.

Edward A. Johnson is president and Stephen R. Jones, treasurer.

The McLaurin-Jones Co., of Brookfield operates a plant in Ware, auxiliary to the main factory, where coated papers and gummed materials are produced.

The Ware Foundry, Inc., with capital of $10,000 produces iron and brass castings, M. L. Jordan being president and treasurer and J. T. Storrs, secretary.

The Ware Lumber Company employs fifty operatives in the manufacture of wooden boxes, B. W. Southworth being president, G. S. Southworth, vice president, and F. K. Southworth, treasurer.

The J. T. Wood Shoe Company is the town's only footwear concern. While other shoe manufacturers have experienced trouble in operating constantly, this concern has afforded steady employment for its growing force of men and women, over a long period of years.

THE WARE VALLEY MANUFACTURING COMPANY

The Ware Valley Manufacturing Company was incorporated February 21, 1927, when it took over the old Otis Company's underwear department, the capitalization being fixed at $700,000. Under the old management the plant manufactured light-weight men's underwear, and under the new officers this line has been continued, but a vigorous effort has been made to develop style features to attract the trade. About fifty per cent of the mill's product is light-weight balbriggan underwear and as a side line a new type of athletic underwear, consisting of jersey and track pants, has been added, the concern being the exclusive American manufacturer for celanese underwear for men. Celanese is made on a cotton linters base and is said to possess several advantages over rayon, as being a woven rather than a knitted fabric, and the Ware Company is in a good strategic position to take advantage of new trends in the industry. The concern has successfully styled men's underwear, and it seems to be pushing the era of "red flannels" off the industrial map.

Indications of the fresh point of view with which this company has faced its problem is the manner in which it has revised its merchandising policy. In many localities it is operating under the agency plan, and it is advertising liberally, using the well known "Otis" trademark, which it bought, and has materially increased its export business.

Its officers are: president, Elroy Curtis; vice president, Arthur Powell; treasurer, Frank E. Whitman; secretary, John E. Fullager.

In 1928, the Robert Gillespie Company removed to Ware from Cambridge and carries on the manufacture of elevating machinery. Competition not being keen in this field, the concern enjoys a steady market for its products. Robert Gillespie is owner and manager of the company.

The Monarch Novelty Co., manufacturing small novelties, removed to Ware from Woonsocket, R. I., in 1928, and has a larger and better equipped plant than it owned in the latter city. The concern is owned by William Ray.

In 1929, William B. Rood and Sidney C. McHenry organized a company to manufacture rayon underwear, installing the machinery in the former's building, on Pleasant Street. The concern plans to expand and to utilize all of this structure, and if necessary to occupy the business block, owned by Mr. Rood, which adjoins the present factory. The products are marketed direct to consumers through agents.

THE INDUSTRIES OF WILLIAMSBURG

In 1809 the first mill for the manufacture of cotton yarn was built in Haydenville, in the town of Williamsburg, and was operated the greater part of the time from that year on until May 16, 1874, when it was swept away in the great Mill River flood.

In 1830 the manufacture of patented wire-eyed buttons was begun in the village of Haydenville, in Williamsburg, by William Hayden, who had removed there from Waterbury, Conn. In 1838 he employed 200 hands, and capitalized his concern at $100,000. The following year he began to produce steel pens.

In 1834 Joel Hayden began the manufacture in Haydenville of flexible buttons, and later removed his operations to Easthampton, where the National Button Company was established and where he employed 140 persons in the seventies, and 175 in 1880.

Six miles out of Northampton, on the old Berkshire Trail, now a beautiful automobile artery, nestling between orchard-covered hills, in the attractive little village of Haydenville, lies the historic plant of The Haydenville Company, established in 1845, by Joe Hayden, who later became Lieutenant-Governor of the Commonwealth, and by Albert D. Sanders.

It prospered until 1874 when the disastrous Mill River flood, accompanied by the sacrifice of many lives, and the destruction of hundreds of thousands of dollars worth of property, swept away its physical assets. In 1875-76 the factory was rebuilt on the site of the old plant, and from that time to this the company has served the country with its brass faucets, valves and fountains for plumbers and steam fitters. Here, many useful and sanitary devices have been devoloped to mechanical perfection, and here over ninety per cent of its skilled workmen live in their own homes.

The extent of the plant may be visualized by a study of these figures. The finishing shop is 360 by 40 feet; the brass foundry, 102 by 80 feet; the iron foundry, 50 by 38 feet; the core shop, 106 by 32 feet; the pattern house, 40 by 30 feet, and the office building, 50 by 35 feet.

Capitalized for $150,000 and employing 175 hands the concern has been a great factor in building up a community of happy, contented and efficient workers. C. J. Hills is president, and R. B. Hills, treasurer and secretary.

The Progressive Iron Foundry & Machine Co., owned by C. J. and R. B. Hills, is a subsidiary corporation of the Haydenville unit, and produces grey iron castings.

In 1897 Herbert A. Smith removed the business of the Hampshire Pearl Button Company from West Chesterfield, where he had established it, to Williamsburg and when the assets were sold and removed to Amsterdam, N. Y., Mr. Smith and Stephen Jorgensen began a new business along the same line, erecting a modern plant two years later. In 1910 Mr. Jorgensen retired and the concern was incorporated as the Hampshire Pearl Button Company.

CHAPTER XXXIII

LOWELL—THE SPINDLE CITY

The Proprietors of the Locks and Canals of the Merrimac River were chartered by the General Court, on June 27, 1792, to provide navigation from the northerly line of the Commonwealth of Massachusetts to the sea, and the following year a charter was granted to the proprietors of the Middlesex Canal to connect the Merrimac River, above Pawtucket Falls, with Medford River. Two years afterwards the passage of an additional act of the Legislature granted the right to continue this canal to Boston.

This legislative grant rendered the completion of navigation down the Merrimac of small importance and the work of the Proprietors of that grant was limited to passing Wiscassi Falls by a single lock and of negotiating Pawtucket Falls by five locks, via a canal one and three quarters miles long, with a fall of 32 feet.

The undertaking is believed to have been the first canal in America in which boats were lifted from one lock to another, when floating in the lock itself.

The charter was dated but thirty-three years after that granted the Bridgewater Canal in Lancashire, England, which was the beginning of the British barge navigation policy.

The Middlesex Canal, which ultimately connected Lowell with tide-water, via the Concord River, a tributary of the Merrimac, and which was laid out through Medford, Woburn, and Wilmington, was the first artery of transportation to improve on the ox-team as a means of bringing commodities to the market. Begun in 1794, and completed in 1803, it was the first great enterprise of its kind brought to a finality in the United States.

Its most notable factors were the five locks, designed to carry canal boats around Pawtucket Falls, at Lowell, the summit level being 107 feet above tide-water, and 32 feet above the Merrimac River, at that city. The total descent to the sea was effected by twenty-two locks, each 90 feet long by twelve feet wide, and built of solid masonry, which were located at strategic points from Pawtucket Falls to Charlestown. Altogether the canal cost, with its locks, seven aqueducts, and several bridges, approximately $550,000, the total distance from the point where it joined the Merrimac River, at Lowell, to its terminus, at Charlestown, being 27½ miles.

The canal was abandoned in 1822, when it gave way to "white coal," but undoubtedly it was primarily responsible, with the Pawtucket Falls, for the location of a textile city that is world-famous.

THE EARLY INDUSTRIES OF LOWELL

Industries antedating the existence of Lowell as a municipality were the first carding mill operated by power, in the United States, which was set up in 1801, by Moses Hale, in that section of Chelmsford that is now a part of Lowell; and a window-glass factory, which began produc-

tion in 1802, and which, at one period, employed 100 hands, and turned out annually 300,000 feet of glass.

In 1813 cotton goods were manufactured by Phineas Whiting and Josiah Fletcher, who erected that year, at a cost of $3,000, a large wooden factory, on the Concord River, at Wamesit Falls, and five years later they transferred the building and water power to Thomas Hurd, who erected a brick mill and converted the factory into a woolen plant, with fifty looms. In 1821 the factory was burned and later was rebuilt. In 1828 it became the property of the Middlesex Company.

In 1818, in that part of Chelmsford which afterward became Lowell, flannels were being produced by Winthrop Howe, satinets by Thomas Hurd, and gunpowder by Moses Hale, who established his mill on the banks of the Concord River, that year. During the Mexican War, more than a million pounds of powder were made at this factory. Four years later the gunpowder plant of Tileston, Whipple & Hale was being conducted on a large scale, with a stamping mill of forty pestles, capable of making from 3,000 to 4,000 casks of 25,000 pounds each per year. At that time, the firm had nearly completed a much larger factory on the Concord River, and had named their product, "Boston Gunpowder."

THE MERRIMACK MANUFACTURING COMPANY

The genesis of the idea of establishing textile plants on the banks of the Merrimac goes back to the genius of Francis Cabot Lowell, who died before his idea had been completely developed, but who left such a deep impression upon his associates that in time his memory was perpetuated in the name of the community which he never saw and about which he but vaguely dreamed.

The success of the Waltham cotton enterprise, inaugurated by Francis Cabot Lowell, Patrick Tracy Jackson and Nathan Appleton, caused them to turn their attention to establishing another mill at a place where there would be more adequate water facilities, and as early as 1820 they began a search for a suitable site.

Paul Moody, their mechanical mentor, went to Chelmsford and saw the Pawtucket Falls, where now stands the city of Lowell. Deciding that the place would be advantageous, steps were taken by Jackson and Kirk Boott, an Englishman, who had consented to assume the management of the projected enterprise, to acquire the land bordering on the Merrimac River below the falls. They succeeded in purchasing about four hundred acres at an average price of about a hundred dollars an acre.

History has it that Boott represented to the farmers that he wanted to raise wool and fruit, and, when they learned how they had sold valuable mill privileges for a song, their rage was furious, and found expression in heated words.

Boott was empowered by the promoters of the enterprise to buy the shares of the Middlesex Canal Company, and have them conveyed to the directors of the Merrimack Manufacturing Company when it was chartered on February 5, 1822, with $600,000 capital.

Kirk and J. W. Boott held 180 shares, Nathan Appleton and Patrick Tracy Jackson, each 180, and Paul Moody, sixty shares.

Active preparations were at once begun to erect a factory, the site of the first mill being chosen with a view to making full use of the 30-foot drop of the Merrimac, at Pawtucket Falls. Construction was begun in 1822, and the first water wheel was set in motion on September 1, 1823,

while the first cloth came off the looms in November of that year, coarse in texture, but thick and firm. It was sold at 37½ cents a yard.

The concern holds the honor of introducing into America the business of printing calicoes. While it seems probable that a company in Taunton, and another in Dover, N. H., had started actual operations along that line it was the Merrimack unit that first conceived the idea of establishing this trade in the United States. It was also the first enterprise in this country to use cylinder rollers, the printing of calicoes having previously been accomplished by the use of hand blocks. In 1824 the capitalization of the concern was increased to $1,200,000 and three additional mill buildings were erected that year.

Finding it necessary for its own use to build a dam across the river, to enlarge the old Pawtucket Canal, and to construct a branch canal, the new corporation proceeded to carry out this plan, and in 1825 sold all of the land and water-power not required for its own purposes to the Proprietors of the Locks and Canals on the Merrimac River.

The latter constructed the new canals that were required to bring the water-power into use, laid out the town, and built many of the streets and the bridges.

It is interesting to note that in 1824 the Merrimack Manufacturing Company erected St. Anne's Church, in Lowell,—a step that a textile corporation of today would hesitate to take for fear of such an undertaking being declared by the courts to be *ultra vires.*

It is a far cry from the original capital of $600,000 with which the Merrimack Manufacturing Company began business to the $4,000,000 capital now invested in the enterprise; from its small original mill to the eight great main structures and almost countless other buildings, at Lowell, which house 134,056 ring spindles, 3,774 looms, seventeen boilers, nine water-wheels, and seven steam engines providing upwards of 10,000 horse-power, and its 3,500 employees.

In 1928-29 the company erected a new weave shed, at the Lowell plant, at a cost of $60,000.

At its Huntsville, Alabama plant where lawns and print cloths are produced, which are sent to Lowell to be finished, there are 103,008 ring spindles, 2,762 looms, 8 boilers, and 850 employees.

Ward Thoron is treasurer of both units, J. C. Wadleigh is agent at the Lowell plant, and Joseph J. Bradley is agent of the Huntsville unit. Arthur Lyman is president, and Herbert Lyman, vice president.

Plain and fancy cottons, corduroys and velvets are produced at Lowell.

LOWELL'S DEBT TO THE TEXTILE PIONEERS

The debt that Lowell owes to the great quintette of industrial entrepreneurs consisting of Francis Cabot Lowell, that far-visioned textile pioneer, whose name is forever linked with the nomenclature of the city; Nathan Appleton, possessor of "the informing soul which gave direction and force to the whole proceeding;" Patrick Tracy Jackson and Kirk Boott, who "while the new enterprise was still a doubtful experiment nobly embarked in it their fortunes and their honor," and Paul Moody who "by his great executive talents and inventive genius made the experiment an assured and triumphant success," can only be paid by marshalling the combined efforts, constructive work, and continuing courage of the men who today hold in their hands the destinies of the city's industrial corporations.

It is significant that, although Francis Cabot Lowell had passed away

a few years previously, the welfare plan he had inaugurated at Waltham nearly a decade before was transplanted to the plant on the Merrimac, and neat, well-kept boarding houses, with homelike comforts, and restrictions, and a church, library and lecture-room were established, and, as said by the late Governor Greenhalge, upon the 50th anniversary of the founding of the city of Lowell, "religion, culture and refinement lent their sweet influences to the life of toil," and here "a new doctrine was proclaimed,—that the welfare of the employed was a necessary factor to the success of the employer. They were one in interest, one in the loss and one in the gain; one in prosperity and one in adversity. Milton tells of a music so divine that it would create a soul under the ribs of death. Francis Cabot Lowell discovered and applied a principle that created a soul under ribs of industrial economy."

When, in 1826, that part of the old town of Chelmsford surrounding Pawtucket Falls was incorporated as a separate municipality and named "Lowell," it is related that two names were suggested to the legislature,—Lowell, in honor of the man who originated the cotton mill as it exists today, and Derby, for the town in England, in which were located what at that period were the greatest hosiery mills in the world.

When the subject was broached to Nathan Appleton, the life-long friend and admirer of Lowell, he emphatically urged that the new town be named in honor of the one whose "foot never trod the streets of Lowell." "The men whose hearts caught fire from his thought decided that the Manchester of America should be his monument," said Appleton. The influence of cotton manufacture upon the town is shown by the fact that the village had made a gain of 1,100% in the preceding six years when its population rose from 200 to 2,300 souls.

At the time the Lowell cotton mills were begun, the era of mechanical industry for women was making its advent in the United States. Within a short period after the Merrimack Manufacturing Company began to operate, news of the opportunities to be found in the mill town spread about the countryside, and when the operatives returned to their homes for a holiday, or for other reasons, their accounts of the congenial life in Lowell induced others to return with them, particularly those who desired literary or social advantages, as well as work. They heard of the lyceum lectures, such as were provided by the Lowell Institute; the Mechanics Association, and other groups of equally high repute; they learned of the circulating libraries, and of the clubs and societies whose activities afforded advancement and companionship, and soon there developed a community life unique in the history of America.

Even as early as 1840, 978 female operatives in the Lowell cotton textile plants were depositors in the Lowell Institution for Savings, with average accounts of $100 each, and before the end of the first half of the nineteenth century two-thirds of the deposits in the various savings bank in Lowell were held in the names of mill operatives.

Ralph Waldo Emerson once said that the children of New England between 1820 and 1840 were "born with knives in their brains," and it would seem as if some of them migrated to Lowell, as the girl operatives of the mills there during that period conducted a magazine called "The Lowell Offering," which attained world-wide popularity. Professor Peabody, of Harvard, who lectured every winter for the Lowell Lyceum, said that four-fifths of his audiences were factory girls, whom he found intently reading until the hour arrived for his address, when books were exchanged for pads and pencils, the note-taking being more assiduous

than he had ever observed in any college classroom. Harriet Martineau wrote a friend that her Lowell audiences were composed mostly of girls who worked in mills seventy hours a week, but who showed no signs of weariness with "minds kept fresh, strong and free by knowledge and power of thought accounted for by the fact that they were not worn and depressed under labors." Charles Dickens in his "American Notes," published after a tour of the United States in the early forties, wrote at length of his visit to the Lowell cotton mills, being favorably impressed by the well-dressed, clean and healthy appearance of the girls, who had "the manners of young women, not of degraded brutes of burden."

Anthony Trollope wrote that the Lowell mill girls were infinitely superior to those employed in the cotton mills of England, and David Crockett stated in a characteristic manner that "he wanted to see how it was that these Northerners could buy our cotton, and carry it home, manufacture it, bring it back and sell it for half nothing, and in the meantime live well and make money besides," while the girl operatives pouring out of the mill gates appeared to him as if coming from "a quilting frolic."

CARING FOR THE WELFARE OF THE TEXTILE WORKERS

A study of the Lowell mills reveals the fact that the popular criticism of indifference to the welfare of textile operatives is entirely unjustified, and it is doubtful if anywhere in the world has any industrial enterprise revealed so consistent an interest in employees over so long a period of time as is found in New England factories.

It was in Lowell that proper mill heating was first introduced; that a supply of pure air, by means of adequate ventilation, was secured; and that each tenement house was required to maintain one unoccupied room for use in case of illness. In 1841, the Lowell corporations founded a hospital, the first one in this country and probably in the world, to be established by an industry. The first brick side-walk in Lowell led from the mills to the boarding houses in order that the operatives might avoid colds contracted from wet feet. There, also, running water was introduced into the mills, tenements, and boarding houses in advance of the building of any water works system in New England. The first application of steam heat was made in the Lowell mills, and the first system of sewers, designed to carry away waste water from the dye houses and bleacheries was installed in Lowell. The sperm oil lamps, which later were superseded by kerosene, were followed by illumination with gas, the Lowell factories establishing their own gas plants long before there were built local gas works for commercial purposes.

All of these protective and sanitary measures were but the forerunners of the Americanization classes, the women's social and educational clubs, the industrial nursing service, the cafeteria lunch rooms, the cooking and home economic units, the industrial medical forces, and the other welfare activities that are carried on in the Lowell textile plants of today.

THE BEGINNING OF THE SACO-LOWELL SHOPS

When the Merrimack Manufacturing Company decided to build the second unit of its plant, it entered into a contract with the Boston Manufacturing Company of Waltham, to release Paul Moody, from his engagement in the latter town, and to allow the use of its patterns and patent rights, for which a consideration of $75,000 was paid. Moody at once removed to East Chelmsford, and began the erection of the machine shop

in 1824, and from that date until his death, in 1831, most of the machinery set up in the Lowell mills was built and installed under his supervision.

In 1825, upon the completion of the machinery for the Merrimack unit, the machine shop was sold to the Proprietors of the Locks and Canals on the Merrimac River, and that group at once undertook the construction of all kinds of machine products.

During these early years, the shop manufactured not only textile machinery, but also other machines of various kinds, the Swain turbine wheel, the invention of one of the employees, being first produced there. American locomotives were also turned out in the plant.

The Lowell Machine Shop played a stellar role in the development of railroad transportation in the United States, as the first locomotive built in this country was completed there in 1835, it being made for the Boston & Lowell R. R. Co., now the southern division of the Boston & Maine. It was named "The Jackson," in honor of Patrick Tracy Jackson, one of the financiers of the road, but history records that the Whigs of Lowell strenuously objected to the nomenclature, as they feared people would obtain the idea that the engine had been named for Andrew Jackson, then President of the United States, and who was anathema to the Whigs. Finally, their wrath was appeased by changing the name to "The Patrick." At the time this initial locomotive was being built, George Washington Whistler was chief engineer of the shop and was one of the first passengers to ride on the new line. But his claim to distinction is even greater as he was the father of the famous American artist and son of Lowell, James McNeil Whistler.

For about twenty years, the shop continued to be owned by the Locks and Canals, and by 1845, the plant consisted of four shops, a smithy, and a foundry, employing in all an average of 500 men, with an annual production in machinery of $230,000. The employees worked on an average of 73 hours a week, and had only four holidays a year—Fast Day, July 4th, Thanksgiving and Christmas.

At this time a new phase in the history of the shop began through its sale in 1845 by the Proprietors of the Locks and Canals to a company organized by Messrs. Abbott Lawrence, Nathan Appleton, and John Lowell. They incorporated it as the Lowell Machine Shop, with an authorized capital of $500,000. Their aim was to provide complete equipment for cotton mills. Enlargements and improvements followed from time to time as the growth of the business warranted, and, in 1882, the main shop was rebuilt without the loss of a single day's production.

ITS DIVERSIFIED PRODUCTION PROGRAM

The output of the company included cotton machinery, such as opening and picking equipment, cards, spinning frames, warpers, and looms. In addition, mill gearing, shafting, and water wheels were made at that time. It also comprised steam boilers until 1870, paper machinery from 1858 to 1862, and machinists' tools until 1854. The shop continued to put out locomotives of the heavier type then coming into demand, until 1861. One commentator declares that "what the Baldwin Locomotive Works are to American railroads today, the Locks and Canals Company, later the Lowell Machine Shop was to the transportation system" up to the Civil War. During the war period soldier-mechanics trained in the Lowell Machine Shop rendered invaluable aid in repairing army trains.

The first locomotive crank axle was forged at the shop and the Swain

turbine wheel was the product of one of the employees. Ultimately, it developed into one of the most extensive and best equipped plants in America for the manufacture of cotton textile machinery. At the World's Fair, in Chicago, in 1893, the company's looms received the highest awards for being durably built, and adapted to high speed.

By 1897, the plant included shops, foundry, and boarding houses, and covered some 13 acres of land, with the floor surface of the shops, foundry, etc., exceeding seven acres. The output had increased twelve times since 1845. The shop employed 1,200 men in 1897, as against 500 in 1845.

About this time, a new field opened itself to the management of the Lowell Shop. Before 1897, several unsuccessful attempts had been made by American manufacturers to build worsted machinery in competition with the British, who had kept a strong hold on the trade. In January, 1898, the Lowell Shop, feeling that its past experience in fabricating up-to-date cotton machinery warranted its branching into the worsted machinery line, decided to enter upon the manufacture of worsted spinning frames, the original product being installed in the Lowell plant of the Massachusetts Mohair Plush Company, where it is still operating. It was decided not to depart from the lines of design and principles of construction which had been followed successfully by English builders for many years.

Improvements were made from time to time on the worsted machinery and readily approved and accepted by the trade, and ultimately a full line of worsted machinery was turned out.

THE KITSON SHOP IS ACQUIRED

Up to 1905, the Lowell Shop had not specialized in the manufacture of picking machinery, but that year the company secured control of the Kitson Shop, which was recognized by the trade as a leader in this field and which had been founded in 1849, by M. Richard Kitson, an Englishman, born in 1814, the son of John Kitson, a card clothing manufacturer. The son, when he had become grounded in the father's business, sought a field in which he might develop more rapidly, and came to the United States in 1849. He settled in Lowell where he opened a shop on Broadway which turned out the first needle-pointed card clothing to be manufactured in America. His mechanical genius kept him from concentrating solely on this line, and he soon turned his attention to the picker which he remodelled and improved after some experimentation. His first real invention, however, came in 1852 when he devised a single cotton opener. His introduction of the needle-pointed cylinder in place of the beater in cotton pickers was a notable advance, and he was one of those who helped in the development of the "Trunk System" which has since been extensively used.

At first, his machinery was made by outside companies, but as his business and the demand for his product increased, he purchased land in the rear of the present Kitson Shop in 1860 with a view to building a plant of his own. A portion of this area was taken by the city for an extension to Worthen Street, so that he was forced to acquire that on which the present works are located, and where he began the creation of the Kitson Shop.

By 1874, this end of his business had grown to no inconsiderable dimensions, and, following the trend of times, it was incorporated under the

name of Kitson Machine Company. In 1905, the name of the company was changed to The Kitson Machine Shop.

In November, 1908, it received an order from the American Silk Spinning Company of Providence, R. I., for twelve long silk, and six short silk spinning frames. Draftsmen were sent to the mills, and drawings from which the orders were constructed were made of the imported frames. Since then the activities of the Lowell Shop has been extended so as to include the manufacture of practically all the preparatory machinery for spun silk.

THE AMALGAMATION OF THE SACO-LOWELL SHOPS

In 1912, the Lowell Shop and the Saco-Pettee Works, which had gained a reputation in cards, roving and spinning frames, were combined under the name of the Saco-Lowell Shops, and the central offices were moved to Boston.

Since this consolidation, many extensive improvements have been made at the Lowell Shop. In 1921, a most up-to-date concrete building was erected, and was almost exclusively devoted to the construction of all kinds of flyers, being the only product of its kind in the world manufactured by machinery.

The progressive policy of the company was manifested again in 1922 by the introduction of the French worsted style of machinery which has a tremendous demand in America. In 1923, the company erected another large unit, at Lowell.

Finally, the last year of the first century of existence of the Lowell Shops found the completion of another sizable addition to the plant and frequently within the past ten years as many as 3,000 hands have been employed in the shop which occupies seventeen acres of floor space.

In 1928, in the interest of economical operation and efficiency, the old Lowell Machine Shop was abandoned, and the up-to-date machinery was moved to the Kitson, Newton Upper Falls, and Biddeford units of the Saco-Lowell Shops. One of the machines in the Lowell Shop at that time was a lathe, built in 1820, which turned the turrets of the *Monitor*, the first iron-clad ship of the U. S. Navy.

The first cotton mill ever built in China was equipped with machinery from the Lowell Machine Shops, the order being placed by Li Hung Chang, the Minister from China to Washington. About the same period the first textile mill equipment ever used in Brazil was shipped from the same unit to the Companhia Uniao Caxieuse, a mill so successful that it paid dividends of over 100% in the first year of its operation.

There is hardly a cotton manufacturing country in the world that is not operating Saco-Lowell machinery. It is found in the Argentine, in Austria, Brazil, Canada, Chile, China, Colombia, Ecuador, Finland, France, India, Indo-China, Ireland, Italy, Japan, Mexico, Peru, Spain, Sweden and Venezuela.

In addition to the unit at Newton Upper Falls, which is treated in the chapter devoted to the industries of that city, the Saco-Lowell Shops operate a large unit at Biddeford, Maine, where 2,000 hands are employed.

Thus it is seen that the impetus to the manufacture of textile machinery in America as a separate industry was provided by the pioneer Massachusetts cotton manufacturers, who, having been forced, first, to build their own mechanical helpers, were prompted to form new companies for the express purpose of making textile machinery.

THE HAMILTON, APPLETON, MIDDLESEX, SUFFOLK, AND LAWRENCE ENTERPRISES

The first sale made by the Locks and Canals Company after its reorganization by the promoters of the Merrimack Manufacturing Company was to the Hamilton Manufacturing Company, in 1825. Although the concern was not incorporated until the following year, its initial capital was $600,000, which later was increased to $900,000. The mill produced twilled and fancy goods, and the first cotton mill drill which played such a prominent part in the trade with the East was manufactured in this plant. In 1826, the Merrimack Manufacturing Company paid its first dividend of 10 per cent. The Appleton Company was incorporated in 1826, with $500,000 capital, and the Lowell Company was formed in 1828, with $500,000 capital. It began operations in 1830 through the efforts of Amos and Abbott Lawrence. By that date the town of Lowell, incorporated in 1824, had a population of 3,500 souls.

In 1830, the Middlesex Company was incorporated, with capital of $1,000,000 and the following year, due to material reductions in power rates made by the Proprietors of the Locks and Canals Company, of Lowell Amos and Abbott Lawrence assisted in the formation of the Suffolk Company, with capital of $450,000; the Tremont Mills, which were capitalized for $500,000, and the Lawrence Manufacturing Company which had initial capital of $1,200,000. Its original product was coarse cotton cloth, and in 1864 knitted stockings and underwear were added. In 1896 cotton weaving was discontinued, and the concern now produces cotton, merino and rayon dresses, light weight and wool knitted cloth, sweater coats, men's, women's and children's flat, fleece-lined, athletic, mesh, ribbed and rayon underwear, union suits and cotton hosiery yarns. It also dyes, bleaches and finishes its products. It is equipped with 300 cotton cards, 30 combs, 67,000 ring and 780 twist spindles, 750 knitting and 1,067 sewing machines, eight boilers, six water wheels, and employs 1,200 operatives.

The corporation has capital of $750,000. Brooks Stevens is president and treasurer, Ames Stevens, secretary, and Brooks Stevens, Jr., assistant treasurer and general manager.

THE A. L. BROOKS COMPANY

The A. L. Brooks Company dates from 1830 when Artemas L. Brooks began the manufacture of wooden boxes, and carried on lumbering operations. On January 7, 1837, Mr. Brooks was granted a patent on an improvement on Woodworth's planing machine, which employed two revolving cutters and planed both sides of a piece of lumber simultaneously. Mr. Brooks' invention became known as the "double-surfacer."

The A. L. Brooks Company has capital of $60,000. Arthur J. Murkland is president, A. F. Woodworth, clerk, and A. B. Woodworth, treasurer.

THE 1833 INDUSTRIAL PICTURE

In 1833, the capital invested in Lowell textiles was $6,150,000 and there were 84,000 spindles, 3,000 looms and 5,000 operatives. The local plants manufactured 27,000,000 yards of cotton goods, used 200,000 bales of cotton, wove 150,000 yards of cassimeres and 120,000 yards of ingrain

and other carpetings, that year. They paid wages aggregating $1,200,000, and the machine shops of Lowell gave work to 200 machinists, and used 600 tons of iron yearly.

THE LOWELL BLEACHERY

In 1833 the Lowell Bleachery was incorporated by Jonathan Derby, John Clark and Augustus H. Fisher, and is still in operation as a subsidiary of the National Fabric & Finishing Company, whose headquarters are in New York City. It became a corporation in 1924, ninety-one years after it was established. It is capitalized for $20,000, employs 450 operatives in bleaching, dyeing and finishing, and maintains a Boston office at 58 Lincoln Street.

C. W. Souther is president, Mark A. Adams, clerk, and L. E. Richardson, treasurer.

THE BOOTT MILLS

The Boott Cotton Mills were established March 27, 1835, by Kirk Boott, one of the founders of Lowell, to manufacture cotton cloth. The original capital was $1,000,000, but on February 11, 1837, permission was given by the legislature to increase it to $1,500,000. The initial spindlage was 54,936.

The incorporators of the concern were Abbott Lawrence, first treasurer of the Lowell Machine Shop, president of the Atlantic Cotton Mills and of the Pacific Mills Co., of Lawrence, Nathan Appleton, an associate of Francis L. Lowell, one of the pioneers in harnessing the water-power, at Pawtucket Falls, founder and largest owner of the Hamilton Manufacturing Company, and a member of Congress, and John Amory Lowell, who became the first treasurer of the Boott Mills. He was the son of John Lowell, then a Judge of the United States Circuit Court, and was graduated at Harvard, in 1815, when but sixteen years of age. He began his business education with Kirk Boott and Sons, and later became a partner with John Wright Boott.

From 1835 to 1848, John Amory Lowell served as treasurer of the Boott Mills, becoming President of the corporation the latter year and serving until his death, on October 13, 1884. He was a fellow of Harvard University, a classical scholar and mathematician, a botanist of attainment, and a master of several languages. He was succeeded as treasurer by T. Jefferson Coolidge, who held the office from 1848 to 1858 and who was followed by Richard D. Rogers, who continued until 1865. Augustus Lowell was treasurer from 1865 to 1875, Elliott C. Clark succeeding him in 1875, and serving until 1903.

Alonzo S. Covell was treasurer for one year and was followed by Charles F. Young. The first treasurer of the reorganized concern, the Boott Mills, was Frederick Arthur Flather, who was elected in 1905 and who still holds the position.

The nine mills of the company employ 1,000 hands, are equipped with 100,000 spindles and 2,600 looms, and produce corduroy, velveteen, seamless bags, cotton duck, reps, scrim, curtains, and absorbent towels and toweling. The plant covers eight acres, the machinery being driven by eight water-wheels and two steam turbo-generators which develop about 6,000 horse-power. The concern is capitalized for $1,250,000 and ranks



KIRK C. BOOTT, FOUNDER OF THE
BOOTT MILLS, LOWELL



ORIGINAL PLANT OF THE BOOTT MILLS, LOWELL



PRESENT PLANT, BOOTT MILLS, LOWELL

as one of the most progressive Massachusetts textile units, having within recent years widely advertised its products nationally, thus materially extending its area of distribution.

Charles F. Ayer is president, Frank W. Hall, clerk, and J. R. Flather, secretary.

THE DANIEL CUSHING COMPANY

Among Lowell's oldest firms, as aged as the city itself, is Daniel Cushing & Co., sheet metal manufacturers, which was established in 1835. Long and honorable is its record, and the traditions built up over that lengthy period are carefully nurtured by its present proprietor, J. L. Cushing.

It was founded by Daniel Cushing, whose name it still bears, and who came to Lowell in 1835 from Providence, R. I. He was the inventor of the oven, as an attachment of the stove, and began his sheet metal business in a store under the Universalist Church, which then stood at Shattuck and Market streets. There he made stoves, and also did sheet metal work of all kinds.

Mr. Cushing built the first gasometer, which was located on Tremont Street, on the site now occupied by the buildings of the Tremont & Suffolk Mills. He remained in that location until 1874, when a removal was made to the top floor of the Stott Building. In 1918 the company's present plant, at 116 Fletcher Street, was purchased. Joseph L. Cushing is the sole proprietor of the concern, which employs 25 operatives.

THE INFLUENCE OF THE TEXTILE MILLS ON THE GROWTH OF LOWELL

By 1836 the population of Lowell had multiplied sixfold, there being 17,633 persons in the town, and that year a city charter was applied for.

In 1837, a little more than ninety years ago, the major concerns were:

	Capital	*Spindles*	*Looms*	*Employees*
Merrimack Mfg. Co.	$1,500,000	25,704	1,253	1,321 females 437 males
Hamilton Co.	900,000	19,456	560	780 females 200 males
Appleton Co.	500,000	11,776	380	470 females 65 males
Lowell Co.	500,000	5,000	212[1]	325 females 150 males
Suffolk Co.	450,000	10,752	460	460 females 70 males
Tremont Co.	500,000	11,520	416	460 females 70 males
Lawrence Co.	1,200,000	31,000	910	1,250 females 200 males
Middlesex Co.	500,000	4,620	130[2]	350 females 185 males
Boott Cotton Mills	1,000,000			
	(two mills erected but not in operation)			
	$7,000,000	119,828	4,321	6,793

1. Of this total 142 were cotton looms, and 70 carpet looms.
2. Of this total 38 were broadcloth looms, and 92 cassimere looms.

The capacity of the cotton textile units at that time was as follows:

Merrimack Mfg. Co.	184,000 yards weekly
Hamilton Co.	70,000 yards weekly
Appleton Co.	100,000 yards weekly
Lowell Co.	55,000 yards weekly
Suffolk Co.	90,000 yards weekly
Tremont Co.	125,800 yards weekly
Lawrence Co.	200,000 yards weekly
Middlesex Co.	6,300 yards of cassimeres and 1,500 yards of broadcloth, weekly

In addition, the Whipple Powder Mills, the Lowell Bleachery, the Flannel Mills, a card and whip factory, a planing machine plant, a reed factory, a worsted mill, with 1,200 spindles, and 125 looms, with grist- and saw mills, completed the industrial picture.

Betwen 1836 and 1839, despite a period of severe business depression the local spindlage rose from 130,000 to 163,000 and in 1839 the Whitney Mills were incorporated and C. P. Talbot & Co., began the manufacture of chemicals. Further improvements in the construction of a canal along the bank of the Merrimac River and rights to control the outlets of Lake Winnepesaukee were established. Then, too, changes in the water power rights were effected, by which the corporations instead of becoming lessees of the water power became part proprietors, and from then on Lowell's development was continuous and rapid.

THE KNOWLES SCALE WORKS

In 1837, the year following the incorporation of Lowell as a city, Woods & Nute began the manufacturing of beam scales. The business was later taken over by John A. Knowles, Jr., who continued the ownership of it until his death in 1883, when he was succeeded by William H. Thompson of Salem, who operated the concern until 1885, when Walter Hoyt, who had entered the employ some years before as a bookkeeper, purchased it and continued in its management until 1922. That year Marcus J. Cole, long identified with the Saco-Lowell shops in an official capacity, bought the concern and owns it today. From the beginning the Knowles plant produced a variety of scales that met the standard domestic and foreign requirements, and for many years the firm's specialty has been market scales. Mr. Cole perfected apparatus for the repairing of heavy duty scales used in the weighing of materials in trucks or freight cars, which inventions increased the firm's business to a material extent. While its domestic business has increased, the demands from South America, Mexico, Spain and other foreign markets are far greater and show continuous progress.

THE C. B. COBURN COMPANY AND THE MASSACHUSETTS COTTON MILLS

In 1837, Charles B. Coburn founded the C. B. Coburn Co., which still purveys its paint, oil and chemical products to the trade. B. W. Foss is president and treasurer of the concern, which has capital of $50,000 and employs thirty-five hands.

The Massachusetts Cotton Mills were established in 1839, and ultimately operated 161,000 spindles and 4,465 looms. The realty of the corporation, some 35 acres in extent, and its other assets, were acquired a few years ago by the Pepperell Manufacturing Company.

JOHN SIMPSON'S ACTIVITIES

John Simpson, of Lowell, is said to have made the machinery for more saw and grist mills than any other person or firm in New England. He began business in that city about 1840. In 1852 he had the misfortune of having the new plant which he was then erecting destroyed by fire, when nearly completed, but he immediately rebuilt on a still larger scale, and engaged in the manufacture of stationary steam engines of from three to 100 horse-power, besides carrying on a general machine business.

THE DAVIS & SARGENT LUMBER CO.

Founded in 1840, as the Davis, Melandy & Sargent Co., the partnership of Davis & Sargent was formed twelve years later when Mr. Melandy retired, and this name was retained until 1893, when the firm was incorporated as the Davis & Sargent Lumber Co. The first realty owned by the three founders was a sawmill, erected on the banks of the Pawtucket canal, where logs were sawed and sorted. Later a planing mill was erected where lumber was milled into box shooks. Rapid strides followed and within a short time the concern became one of the largest of its kind in northern Middlesex County, a position it has steadfastly held. The development of its packing case, shook and lumber business, however, did not restrain the progressive spirit of the owners, for they also developed a successful line of interior and exterior building finishes, and other wood products. Following the death of Edward H. Scribner, about three years ago, his two sons, Ernest D., and Stephen H., assumed control and management of the corporation, which is capitalized for $100,000 and employs fifty operatives. Ernest D. Scribner is president and treasurer and Stephen H. Scribner, assistant treasurer and clerk.

THE AYER COMPANY

Dr. James Cook Ayer was one of the men who made the city of Lowell famous for more than a generation by liberally advertising the claims of Ayer's Sarsaparilla, Cherry Pectoral, and his famous Cathartic Pills. The concern purveying this medicinal preparation, founded by him in 1841, was known from 1855 to 1877 as Dr. J. C. Ayer & Co., and in the latter year it became The J. C. Ayer Company. It was in 1855 that Frederick Ayer, a brother of the founder, became a partner in the business. The Messrs. Ayer interested themselves in the Tremont Mills and the Suffolk Manufacturing Company, which were hard hit during the panic of 1857, and eventually purchased the controlling interest in each, uniting them, in 1871, and in 1885, Frederick Ayer bought the Washington Mills, in Lawrence, which ultimately were merged into the American Woolen Co.

For a long period of years, when advertising was almost a purely local policy, the Ayer firm expended $60,000 annually in newspaper publicity, besides printing each year 5,000,000 of its famous almanac, in English, French, German, Portuguese and Spanish.

But it paid, for, in the '60s the concern purchased 288,000 pounds of drugs, costing $457,000; 130,000 gallons of pure spirit, valued at $130,000, and 354,000 pounds of sugar, at a cost of $60,000, and used annually 1,100,000 bottles, 1,720,000 pill boxes, 350,000 square feet of packing boxes, and 91,000 square feet of cardboard, while the printing ink and paper used in its circulars cost $65,000 per year. It paid $20,000 a year for its freight and $2,500 for postage—large sums for that period.

The concern today is known as The Ayer Company, is capitalized for

$300,000 and is still controlled and managed by Charles F. Ayer, a descendent of the founder, who is president of the corporation. Frederic Ayer is vice president, T. S. Harris, treasurer, and C. Z. Christopher, secretary.

In 1843, the Prescott Company was incorporated and two years later Whipple's mills were built.

D. LOVEJOY & SONS

Positive evidence that Massachusetts' inventive ingenuity is by no means dead is obtained in the case of the firm of D. Lovejoy & Sons, at whose plant, within recent years, there has been observed one of the most striking developments in the production of a high speed steel knife that will run continuously day after day, and which is manufactured with the utmost care from a Lovejoy grade of high-speed steel exclusively produced for the concern. These knives are heat-treated in modern furnaces which are designed and made especially for this type of product. They are then balanced with extreme accuracy, ground to a micrometer scale, and provided with a unique holdfast finish.

The concern has also developed within the past few years a welded high-speed knife, made by a special process and by specially designed machinery.

The company operates in addition to its extensive Lowell factory a branch plant in Anderson, Ind., and branches in New Orleans, St. Louis, Atlanta and a sales office in New York City.

Daniel Lovejoy, the founder of the concern, built the original unit on the site of the present plant in 1848, and it is the oldest established company of its kind in the United States. He combined the welder, hammersman, and temperer, as well as furnishing the skill, manual labor and capital required, and was the second machine knife manufacturer in the country, his predecessor's business having since changed ownership and name.

In the early days, the furnaces were small, relatively inefficient, and usually fired by coke or coal, making it difficult to maintain uniform heat. Oil furnaces are now used, with control assured by recording instruments.

The keenness, flexibility and strength of the famous Damascus sword is historically well known, but today the steel used by the Lovejoy concern is equally keen, far stronger and more tough than that turned out centuries ago.

It is not an overdrawn statement to assert that no other branch of the shoe and leather art has made greater strides in the last seventy-five years than that pertaining to the development of fancy leathers, including imitation of all kinds of birds, beasts and fish hides and skins, and it is openly admitted that the Lovejoy concern has made this result possible by designing and producing fleshing and shaving blades, belt splitting knives and other devices that are employed in this specialized leather work.

Within the past thirty years the Lovejoy unit has developed a large foreign market, not only in the British Isles and Continental Europe, but in Japan, Central America, and elsewhere.

The concern is now owned and operated by Roy F. and Elwyn W. Lovejoy, and employs 125 operatives.

THE GEO. W. HARRIS CO.

In 1849 the Geo. W. Harris Company was established to manufacture loom harness, but it was not incorporated until 1910. Harry Ashworth

is president and Joseph Barber treasurer of the corporation, which has capital of $35,000 and employs fifty hands.

In 1872, the founder built a three-story factory, which he occupied until 1881, when it burned. Between April and November of the latter year, he produced 45,000 sets of patented loom harness. In 1867, Mr. Harris formed the firm of Harris & Carey, and engaged in the production of woodworking machinery, in Lowell, in addition to operating the Geo. W. Harris Company.

THE HOBSON & LAWLER CO.

The history of the Hobson & Lawler Company goes back eighty years. It was about 1850 that H. R. Barker established the business, and following his death, in May, 1887, the concern became the H. R. Barker Manufacturing Company. It was in 1916 that the name of the enterprise was changed to the Hobson-Lawler Company. Charles H. Hobson is treasurer, and James J. Lawler, an inventor of note, of Mount Vernon, New York, is president.

To Mr. Barker, who founded the business, must go the distinction of being one of the first men in the world to pipe houses for steam heating. His company was among the first to install iron boilers in residences and it was the first to use a one-pipe circuit system. The Hobson & Lawler Co., its successor, was among the pioneers to use the double circuit system and it was the originator of oil heating plants, in Lowell.

This concern deals with steam and oil-heating, plumbing supplies, mill piping and electric refrigeration and is both a wholesale and retail house, selling its goods in large and small lots. In addition the company carries on a mail order business in plumbing supplies and furnishings. It employs thirty men and women.

C. M. MARVEL & COMPANY

In 1852, C. M. Marvel established a plant for the manufacture of cotton and woolen machines in association with C. G. Sargent and David Lane, under the name of Marvel, Sargent & Co. Mr. Sargent retired from the firm about 1855, and L. A. Cutler entered the partnership with Mr. Marvel and the firm name was changed to C. M. Marvel & Co. The original building was 100 by 40 feet, three stories high, with boiler shop attached, with a foundry 64 by 60 feet and in addition to cotton and wool machinery the firm engaged in building stationary engines, printing presses, steam and gas fittings, worsted, hemp and flax machines, hydro-extractors and machinists' tools.

GEORGE WILLMAN'S GREAT INVENTION

George Willman, a native of Boston, while overseer in the repair shop of the Merrimack Manufacturing Company at Lowell, conceived the idea that the need of a self-operating top-card stripper was imperative and essential to the life of the textile industry. About 1835 he set to work on the problem of inventing such a device, and at one period of his investigations he became so discouraged that in a moment of despair he threw his plans and models into the Merrimac River. His ambitions reviving later, he succeeded, in 1853, after nearly twenty years of contemplation and experiments, in constructing an effective and practical stripper, which instantly met with favor. Upon this device he received a patent, but for

a time found himself confronted with litigation. Eventually, he introduced the device into the factories of England, France, Austria, Belgium, Bavaria, and Saxony, and firms in England and France were given the right to manufacture the machine upon royalty. The principal New England producers of textile machinery were also granted licenses to manufacture the stripper under royalty arrangements.

When Willman completed the first working model of the stripper, he offered to sell it to the corporations in Lowell for $3,000 and to give them the exclusive rights to his invention. After a conference, the agents of the local mills declined to accept the offer, "stupidly," as one local historian wrote, inasmuch as the average cost of stripping a card by hand was $300 yearly, all of which was saved by the invention, while, furthermore, the application of it to each machine involved an outlay of less than $60 and from one-fourth to one-eighth of a cent per pound was saved on raw cotton.

THE LOCAL GROWTH OF COTTON TEXTILES

By 1856 the Lowell textile mills were operating 300,000 spindles and six years later twelve large manufacturing corporations, with $14,000,000 aggregate capital, were operating fifty mills, equipped with 350,000 spindles, or twice as many as there were in 1845. They were equipped with 12,000 looms, used 36,000,000 pounds of cotton each year and turned out annually 80,000,000 yards of cotton goods. These figures appear formidable, but it is interesting to note that in 1927 a single Salem textile concern—The Naumkeag Steam Cotton Company—used about 20,000,000 pound of cotton and produced approximately 32,400,000 yards of 72-inch sheeting that year.

THE CARLETON & HOVEY CO.—FATHER JOHN'S MEDICINE

Although Lowell is known the world over as a textile city, its name has been carried far and wide on bottles containing Father John's Medicine, which has been manufactured in the city for seventy-five years, following successful results secured by Rev. John O'Brien of St. Patrick's Church, from a prescription compounded at the drug store of Carleton & Hovey.

One of the interesting places in Lowell is the old apothecary shop on Merrimac Street, which has been a drug store since 1827. Of course, it has been modernized, but it is still the old drug store. Among its interesting exhibits is the old prescription book used in 1855. On one of its pages, dated June 9, 1855, is written the original prescription for Father John's Medicine, which was compounded for Father O'Brien on that date, and which was so successful in treating his severe cough and cold that he recommended it to his friends and parishioners. Whenever they went to the drug store to buy it they called for "Father John's Medicine," from which its name is derived.

The old prescription book, its pages tattered and worn through years of usage, is still carefully preserved, and the page which shows the greatest wear is that upon which the original prescription was written three-quarters of a century ago.

Because they saw the results which the medicine gave, many doctors have prescribed and recommended Father John's Medicine, and it is today in use in many institutions, hospitals and children's homes from one end of the country to the other.

Aubert J. Fay is president and treasurer of the Carleton & Hovey Co., which has capital of $500,000 and employs 100 hands.

THE BURNHAM & DAVIS LUMBER COMPANY

For nearly three-quarters of a century the Burnham & Davis Lumber Co. has been purveying its products to the people of Middlesex County.

The city of Lowell was but a youthful municipality of twenty years' existence when David Whitney of Westford started the business, but he, like many others, was attracted to the West and sold the enterprise to his brothers, Albert and Hiram. For several years this firm continued operations and on the death of Albert Whitney, his half-interest was bought by Henry L. Tibbets, and the firm became Whitney & Tibbets until the spring of 1888, when the junior partner accepted an important position with one of the largest lumber companies in New England.

Contemporary with Whitney & Tibbets was the Burnham & Moran Lumber Co., of which Crawford Burnham was president. With the death of Mr. Moran, the business was carried on by Mr. Burnham and in 1888, upon the retirement of Mr. Tibbets from Whitney & Tibbets, the surviving member of the Burnham & Moran Lumber Co. associated himself with Charles A. Davis and Charles M. Forrest, who bought the Whitney & Tibbets business and the firm name became Burnham, Forrest & Davis.

In 1892 Mr. Forrest died and the remaining partners purchased his interests and changed the firm name to Burnham & Davis, under which it continued until 1903, when it was incorporated as the Burnham & Davis Lumber Co.

In 1905, Mr. Burnham died and Stephen W. Abbott, who had been foreman for fifteen years previously, purchased his half-interest in the business and became president of the company, with Mr. Davis as treasurer. In 1916 Mr. Davis and Mr. Abbott purchased the other half-interest and became the sole owners. In 1919 Edgar H. Douglas, a son-in-law of Mr. Abbott, became associated in the business and on the death of the latter in 1924, the sole control passed into his hands. He is president and treasurer of the corporation.

Not only is this the oldest lumber concern in the city, but it is one of the largest in Middlesex County. In conjunction with the yards the concern operates its own mill, which is modern in every particular. The corporation has capital of $200,000 and employs thirty-five operatives.

THE WALTER L. PARKER COMPANY

In 1859, Walter H. Parker, grandfather of the present owners of Walter L. Parker Company, began the manufacturing of bobbins and spools for textile mills. He was succeeded by his son, Walter L., under whose management both the products of the concern and its markets grew until the name "Parker" became a byword for bobbins and spools in this and many European countries, in which textile manufacturing is carried on. The present partners, H. Hutchins Parker and Allan D. Parker, have adhered to the high quality of manufacturing established by their forbears with the result that wherever spools or bobbins are used in the fabricating of cotton, wool, silk, or jute, one invariably finds the Parker products. Two hundred operatives are employed at the company's plant.

THE BARBER MANUFACTURING COMPANY

The Barber Manufacturing Company was founded in 1859, by George Washington Harris, to manufacture narrow fabrics. In 1882 he transferred his operations to a modern four-story brick building, which he had erected, and upon his death, his son-in-law, Joseph Barber, assumed the management of the concern. Later the ownership passed to Thomas Burke, whose widow has successfully conducted the business since his death, in 1926.

By 1860 Lowell had 400,000 spindles, but from 1861 to 1865 two-thirds of the total were idle because the Civil War cut off the supply of raw cotton from the South.

THE UNITED STATES BUNTING CO.

In 1865 the United States Bunting Company was established, and was incorporated in 1913, with capital of $300,000. For sixty-five years it has been one of the city's solid and substantial industrial enterprises, and is now engaged in the production of worsted dress fabrics and bunting. The plant equipment consists of 12,000 worsted spindles, 2,041 broad and 110 narrow looms, three sets of cards and four boilers.

It steadily employs 500 operatives and has capital of $300,000. C. B. Stevens is treasurer, and Andrew Marshall, president.

Wherever the flag of the United States flies over government property, either in this country or in the farthest stretches of the world, there the name of the New England Bunting Company is represented, inasmuch as the concern makes all the bunting for the United States government which is fashioned into the flags used by the nation.

At the outset the company manufactured woolen goods exclusively, but later it turned to the making of bunting, and in that line has attained an enviable reputation.

The business was established by John Holt, the father of the late Mrs. E. S. Hylan of Lowell. The plant is now operated by Wellington, Sears & Co., 993 Franklin Street, Boston. Harry L. Bailey is president, and Harry C. Sanborn, secretary and treasurer. Seventy-five hands are employed. The modern and extensive plant is located on Davidson Street.

THE D. L. PAGE COMPANY

Sixty-four years in business in Lowell during which time he has built up an organization known far beyond the limits of this city, is the record of Dudley L. Page—known throughout the city as "Uncle Dudley"—the head of the D. L. Page Company.

The history of Mr. Page's business career in Lowell goes back to the days immediately following the Civil War in which he had served with distinction.

Returning to Lowell in 1866, he bought the firm of J. A. Brackett, whose candy establishment was then located in the basement at the corner of Central and Middle streets. Within a short time this location became too small for the business, and it was removed to larger quarters in the Hildreth Building.

In 1880 larger facilities were again required, and the plant was moved to the Odd Fellows Building, on Merrimac Street. In five years' time these quarters were outgrown and the concern moved to 94 Merrimac Street, and at that period the company was known as Page & Nunn.

With baking and catering added to the candy lines, the business continued its steady increase, and soon the entire building in the rear of the candy store was occupied by the company, and a successful restaurant was also carried on at this location.

Another forward step was taken on May 26, 1913, when the company moved to its present location, in Merrimac square, at which time the D. L. Page Company was incorporated.

Although the founder has been aided by a capable corps of assistants and by those in partnership with him, Mr. Page has always been at his desk in good weather and in bad. Not a single portion of his varied business has missed his presence, or his personal attention during the day, and should he not be found at his desk, he is sure to be located in the candy kitchen upstairs. The corporation has capital of $150,000 and employs upwards of 150 operatives.

Dudley L. Page is president and Willard Symmes, treasurer.

In 1867 the Lowell Felting Mills were incorporated and two years later the Lowell Hosiery Company was formed.

THE W. W. CAREY COMPANY

The W. W. Carey Company was founded in 1868 by Wilson W. Carey, pioneer manufacturer and originator of the Carey wood rim pulley.

The concern has furnished the manufacturing plants of New England and other states with power transmission and woodworking machinery for fifty years.

The Carey Pulley, unlike all others, is made under the patent wedge construction. The pad at the end of the arm is fabricated with a radius smaller than the inside circle of the wood rim, allowing a wooden wedge to be inserted at a point where the rim bolt passes through the rim to the iron pad. These wedges have been man's strongest force and are driven in place at this point, thus eliminating driving strain on rim bolts.

Upon the death of the founder, the management of the business was taken over by his son-in-law, Frank Sherwood, and his grandson, Carey Sherwood, who, in 1929, sold it to Messrs. James P. and Richard I. Robinson, owners of the Robinson Foundry Company. F. H. Dickson, who has been associated with the business for many years, continues as superintendent. The corporation has capital of $75,000 and James P. Robinson is president and Richard T. Robinson, treasurer.

THE W. H. BAGSHAW COMPANY

About 1870, Walter H. Bagshaw, a native of Derbyshire, England, and the son of a comb pin manufacturer, founded the Walter H. Bagshaw Company, which is now conducted by his two sons, Charles H. and Walter J. Bagshaw. Coming to the United States in 1867, the elder Bagshaw's first employment was with a sewing machine manufacturer, but noting the development of textile production and the possibilities of the comb pin industry, he embarked in business, aided by one of his sons. Within a short time twenty-five employees were on the payroll. For years the company's products were confined almost entirely to the demands of the textile business, but the invention of the phonograph and talking machine broadened the field of production. The inventive genius of the founder brought forth a pin for use in these machines, which has enjoyed unrivalled popularity for a number of years. The ingenuity of the father

has descended to the sons, enabling the company to keep abreast of the demands.

Charles H. Bagshaw is president, and Walter J. Bagshaw is treasurer of the corporation, which employs 125 operatives.

In 1870 the principal industrial operations of Lowell were carried on by the Appleton, Boott, Hamilton, Lawrence, Lowell, Massachusetts, Merrimack, Middlesex, Suffolk and Tremont Mills, the Lowell Machine Shop, the Wamesit Steam Mills, the Belvidere Woolen Mills, the Lowell Bleachery and the Lowell Hosiery Company.

JACOB H. SAWYER—INVENTOR OF THE SAWYER SPINDLE

In 1871, an invention in the field of cotton spindles, produced and patented by Jacob H. Sawyer, then agent of the Appleton Mills, in Lowell, entirely revolutionized cotton spinning, and proved to be one of the most important contributions to textile progress. Mr. Sawyer conceived the idea of chambering out the bottom of the bobbin, and carrying the bolster up inside, thus supporting the load which the spindle was required to carry near its center. This change in support of the spindle enabled it to be materially reduced, both in weight and in diameter of the bearings, and resulted in an enormous saving of power. The steadiness of operation was also greatly increased by the location of the upper bearing, this factor also aiding in increasing the speed of rotation. As the speed at which the spindle would operate was at that period the limit of the production of the frame, an increase in capacity for speed spelled a corresponding increase in the production of the machine.

The speed of the common ring spindle then in use had about 5,000 turns a minute. The Sawyer spindle raised these figures to 7,500 turns a minute, thus enabling a unit of a single horse-power to drive the Sawyer invention at the higher speed, while a single horse-power would drive only about 100 ordinary spindles at a lower speed.

This marked increase in production and economy in power, coupled with many incidental advantages, resulted in the rapid introduction of the Sawyer spindle, and over 3,000,000 were sold in the ten-year period succeeding the date of the invention. It remained supreme in the field, after George Draper, of Hopedale, had modified and improved it and had corrected certain of its faults, until the advent of the Rabbeth spindle.

THE C. F. HATCH COMPANY

In 1875 C. F. Hatch began the manufacture of paper boxes in the building on Prescott Street, now occupied by the Robertson Furniture Company.

At the outset the high grade of work of the concern caught the attention of customers, and business began to grow so rapidly that it was necessary for the firm to seek larger quarters. The company moved to Church Street, where it occupied an entire building. Soon further expansion became imperative and the company utilized the old Boston & Lowell depot and the old stone mill on Lawrence Street, at the same time retaining its machinery in the plant on Church Street.

As the business grew and acquired a national list of customers, it was necessary to secure even greater space, and the C. I. Hood factory on Thorndike Street became the home of the concern. Here it occupies four acres of floor space. Facilities at the factory are ideal, railroad tracks

entering the loading room, thus permitting cars to be loaded and unloaded under cover.

The corporation also operates a modern printing plant, on Thorndike Street, where all printing required on the company's boxes is executed.

Upon the death of the founder, in 1907, his son, Arthur E. Hatch, became treasurer and general manager. Under his administration the enterprise has experienced a wonderful growth, and where in its early days it employed but a mere handful of workers, today it utilizes the services of 500 men and women.



PRESENT PLANT OF C. F. HATCH COMPANY, LOWELL

The C. F. Hatch Company has built a solid foundation for itself as an ideal firm through high quality and painstaking service. The company is one of the largest producers of paper boxes in the East and the name of Hatch is known to all manufacturers who require any kind of a paper box in presenting their products to the consuming trade.

Hatch service, which has come to be recognized as one of the big assets of the Lowell company, is embodied in the fact that the concern desires its customers to look upon it as a part of their own organization—a dependable part of their own machine.

R. A. Hatch is president of the corporation, which has capital of $320,000.

THE SHAW STOCKING COMPANY

In 1877, the Shaw Stocking Company was incorporated, with capital of $30,000, and has grown to be one of Lowell's large industries, employing at the present upwards of 500 operatives in the manufacture of hosiery, and having capital of $450,000.

Frank J. Dutcher is president and D. F. Phelps treasurer and clerk. The company's first factory consisted of two small rented rooms. Then Mill No. 1 was built, 238 by 40 feet, three stories high; next, Mill No. 2, 251 by 75 feet, with two stories and a basement; followed by Mill No. 3, 235 by 74 feet, two stories high, and then Mill No. 4, 245 by 118 feet, two

stories and a basement, while altogether 12,432 spindles were installed, together with over 750 Shaw looms.

It was on December 30, 1878, that electric lighting was first tried out in the Merrimack Mills, and four years later the Lowell Electric Light Company began operations with subscriptions for sixteen lights.

THE LAMSON CARRIER

Perhaps no invention more completely revolutionized the methods of large stores than the invention of cash railways and carriers devised by William S. Lamson, and which today is universally known as the Lamson System.

In its primitive form, in which a ball was used, with gravity as the motive power, it was first used in Mr. Lamson's small retail dry goods store on Merrimack Street, in his home city. The development of the invention was rapid, however, and it soon was placed upon the market in the form in which it is today employed throughout the world. The idea came to Mr. Lamson in 1879 when he realized that the customer's time might be conserved by the employment of something mechanical, thereby doing away with the necessity of hiring boys and girls of tender ages to carry money to a cashier and return with the change. For two years after he installed the gravity system in his store, he devoted his hours to perfecting and patenting the invention, and from 1881 to 1891 he was treasurer of the Lamson Store Service Company, as well as treasurer of the United States Mailing Case Company, of Lowell, and from 1895 until his death on August 16, 1912, he was president of the American Mason Safety Tread Company of his home city. In a modified form the Lamson carrier has been used as an ammunition hoist on battleships of the United States Navy, the special machinery having been fabricated at the Lowell factory. The manufacturing operations of the company are now carried on at Syracuse, New York.

THE STIRLING MILLS

In 1880 the Stirling Mills were established with $100,000 capital and were incorporated ten years later. They are engaged in the manufacture of flannels, broadcloths, and women's dress fabrics. The main plant has 7,000 spindles, fourteen sets of cards, ninety-four broad looms, three boilers, and one water wheel, and employs upwards of 300 operatives.

In 1929, after nine months of idleness, the plant of the Belvidere Woolen Mills was purchased by the Stirling Mills, and became known as Mill No. 2 of the latter corporation. All spinning and weaving operations are carried on in this unit, the Stirling Mills plant being exclusively devoted to carding. This accession increased the number of employees of the corporation by from 75 to 100 operatives, making the total in both mills upwards of 200.

L. A. Olney is president and assistant treasurer; George B. Tarbox, clerk; Samuel Rindge, treasurer, and Royal P. White, agent. The corporation has capital of $100,000.

THE SCANNELL BOILER WORKS

The Scannell & Wholey Boiler Works were established in 1880, and upon the retirement of Mr. Wholey, the surviving owner of the plant, Mr. Scannell, changed the name of the enterprise to the Scannell Boiler Works

and formed a partnership with his sons. Upon the death of the father some years ago, Mr. Scannell's four sons, Bartholomew, Frank, George and Philip, assumed the management of the plant. The concern manufactures steel boilers and carries on a general steel and iron plate work business. The corporation has capital of $100,000 and employs seventy-five operatives.

THE AMASA PRATT COMPANY

Fifty years of devotion, untiring effort and energy were the contributions of Amasa Pratt, founder of the Amasa Pratt Company, to the large lumber and church furniture business which stands today as a monument to him and to his progressive ideas and methods. Coming to Lowell to enter the employment of his brother, Matthew, for the purpose of learning the woodworking trade, Amasa Pratt, in the year 1858, upon the demise of his brother, assumed control of the business. The guiding hand of his genius was in evidence from that moment and the expansion of the business was continuous, while its reputation became widespread.

The organizing, mechanical and managerial talent of the father and founder continued after his death in 1926, and still lives in the spirit of the present management which is in the hands of the present partners, Blanchard E. and E. S. Pratt. Seventy-five operatives are employed.

THE JOHN C. MEYER THREAD CO.

More than fifty years ago, John C. Meyer, founder of the John C. Meyer Thread Company, began selling thread to harness, shoe, dress, carriage, awning and tent makers, the business growing to such an extent that frequent removals to larger quarters were found necessary, and in 1904, Mr. Meyer removed to a four-story factory, in Jamaica Plain, which was soon outgrown. In 1908, he purchased an extensive plant in Lowell, and in the intervening years the Meyer threads have gained a world-wide reputation for quality, strength and durability. The concern employs 125 operatives, and the founder is still active in the management, being president of the corporation; his son, Harold F. Meyer, serving as treasurer.

John C. Meyer also owns and operates the Jamaica Dye & Bleach Works, where all the bleaching and dyeing operations are carried on, and where 100 operatives are employed. The officers of this subsidiary concern are identical with those of the John C. Meyer Thread Company.

THE A. F. FRENCH COMPANY

In 1883 A. F. French organized the A. F. French Company, and engaged in the manufacture of paper boxes. His keen foresight, coupled with close application to business and indefatigable energy enabled him to build up a thriving concern, which today enjoys a large and ever-growing clientele. In recent years, Leonard I. French, son of the founder, has become active in the company, which employs twenty-five operatives.

THE T. C. ENTWISTLE CO.

Specialties along the line of patent warping, baling and beaming machines, expansion combs and traverse card grinders, now marketed throughout the world, followed in the wake of the mechanical ability of Thomas C. Entwistle, founder of the T. C. Entwistle Company, who be-

gan operations in a small shop, in 1887. Today, despite the keenest competition, coupled with discouraging conditions, which have confronted the manufacturers of textile machinery, the Entwistle firm maintains its popularity and ranks as one of the most successful and best managed enterprises of its kind in the country. Born in Belmont, Lancashire, England, scion of a family of mill managers, Thomas C. Entwistle began his work in this country, with the Draper Company, of Hopedale, installing in Manchester, N. H., one of the first slashers ever used in that state. Later he removed to Lowell, where he assumed the agency of one of the machine shops then in operation in the city. From there he removed to Hartford, Connecticut, where he occupied a more important position until 1887, when he returned to Lowell and established the concern which bears his name. It is now managed by Frank B. Kenney, president; Clarence R. Howe, vice president, and M. F. Cummings, treasurer. It has capital of $50,000, and employs fifty operatives.

THE BUTTERFIELD PRINTING CO.

The Butterfield Printing Co., Inc., was established in 1889 and was incorporated under the laws of Massachusetts in 1905. At the present, it operates a modern lithographic department, which produces the finest lithographing in colors, as well as letter heads and bill heads.

Starting business in its present location forty-one years ago, the enterprise has gradually become more and more closely linked with the local textile industry, until at the present it executes large quantities of work for textile plants, not only in Lowell, but all over the country, shipping the finished product to wherever cotton goods are made.

The concern is unique among the commercial printers of Lowell in its ability to handle any type of printing, from the smallest to the largest, in creating art and in carrying out all operations under one roof from the time the idea of the customer is submitted until the contract is finished.

Robert W. Thomson is general manager, and treasurer of the concern, and has been connected with it since its formation.

The corporation has capital of $40,000 and employs sixty operatives. Alfred L. Goddard is president, and John F. Porous, clerk.

SHOES, RUGS, BRAIDS AND LACES

In 1888 the John Pilling Shoe Company removed to Lowell from Haverhill, and now employs 350 operatives. The corporation has capital of $50,000. F. A. Pilling is president and treasurer, G. C. McIntyre, vice president, and A. R. Kirkland, secretary.

In 1890, the Economy Rug Works were established, and were incorporated in 1922, with $100,000 capital. Rag rugs are produced in large quantities. Albert Davison is president, F. L. Dawson, treasurer, F. G. Dawson, secretary, and Geo. S. Howe, manager.

The Lowell Braid & Lace Co., owned by Thomas E. and Raymond T. Wilde, manufactures shoe and corset laces, tinsel cords and novelty twine ribbon, utilizing 250 braiding machines.

THE E. V. BATES MACHINE CO.

Eddo V. Bates, founder of the E. V. Bates Machine Company, was the inventor of the idea of the coupling finisher and second breaker, which eliminated the use of creels and creel-tenders, in the weaving of woolens.

This device, first used about forty years ago in the plant of the Merrimack Woolen Corporation, in Dracut, where Mr. Bates was employed, was given but scant approval at first by other woolen manufacturers, but the efficiency and economy of the method won over the opponents so completely that coupled cards are today considered an essential part of every modern woolen mill. Other textile accessories invented by Mr. Bates included card feeders, attachments for Apley-Bramwell feeders, and a metallic tooth breast. The E. V. Bates Machine Company was incorporated on January 1, 1916, has capital of $50,000 and employs twenty-five hands.

Hugh R. McCurtain is president, B. S. Peabody, treasurer, and Gardner W. Pearson, vice president and secretary.

THE MASSACHUSETTS MOHAIR PLUSH CO.

The Massachusetts Mohair Plush Company, incorporated in 1891, has long ranked among the city's leading and most uniformly prosperous industrial enterprises. In its extensive Lowell plant upwards of 400 operatives are employed in producing plushes and yarns and the American traveler who uses a passenger coach on almost any railroad line in the United States occupies a seat that is upholstered with plush manufactured by this Lowell concern. Perhaps no local commodity travels so many miles a year as the seemingly endless yardage made by this corporation for the countless railroad coaches of our great transportation systems. It also produces mohair and worsted yarns.

The concern has capital of $1,000,000, and maintains its sales and treasurer's office at 80 Federal Street, Boston. The plant is equipped with 15,168 worsted and 8,654 twist spindles, 117 looms, four boilers, fourteen worsted cards and fourteen worsted combs. It also does its own dyeing and finishing.

Henry W. Bliss is president, Austin B. Mason and R. B. Houghton, vice presidents and A. B. Mason, treasurer, of the corporation.

The American Hide & Leather Co. operates at Lowell the largest upper leather plant in the world, where some 300 operatives are employed. Another unit is operated at Woburn. John C. Lily is president and George A. Hill, treasurer, of this large corporation, which ranks as one of America's leaders in the manufacture of patent leather and in degreasing operations.

J. M. & E. M. ABBOT, LTD.

In 1892 William E. Walsh established the Park Worsted Mill, which plant was purchased in 1919 by J. M. and E. M. Abbot, who incorporated the concern as J. M. & E. M. Abbot, Ltd., in 1923. When the unit was taken over by the Messrs. Abbot, it was equipped with 1,440 spinning spindles, and about half that number of twisting spindles, the production then being about 2,600 pounds per week, and the average number of employees was thirty-five.

In the succeeding nine years the equipment was increased to 7,400 worsted spindles and 4,400 twist spindles, or more than seven times what it was in 1919. For upwards of three years past the equipment has run nights as well as days, operating over 130 per cent single shift capacity, while the number of employees has grown to 200. The company is capitalized for $450,000, and produces worsted and mohair yarn. J. M. Abbot is president and treasurer, E. M. Abbot, vice president, and P. A. Davis, secretary.

In 1928, occurred the first recorded instance where a northern textile mill purchased the machinery of a liquidated mill in the South when the Abbot concern bought all the machinery of a worsted yarn mill, which was located in Roanoke, Virginia, and removed it to Lowell.

With the addition of the new equipment, the productive capacity of the Lowell plant was increased about 35 per cent, and the company now utilizes about 100,000 square feet of manufacturing space, while its spindlage was increased to 20,000 spindles.

The defunct worsted yarn mill in the South had located in that section because it was thought it would be able to better the prices of the northern plants through cheaper labor and the longer working hours which are in effect in that part of the country. But when the plant was started it was found that it was impractical to manufacture worsted yarn in that climate, and after three years the mill was liquidated. The machinery was practically new and the Lowell mill took advantage of the opportunity to acquire the modern equipment.

THE AMERICAN MASON SAFETY TREAD CO.

In 1892, William S. Lamson, began in a small way to manufacture the safety tread for stairways now so universally used. From the start the possibilities of the business were evident to the inventor and with an aggressiveness which won the admiration of all, he overcame all difficulties, and in 1900 moved to Lowell and began the occupancy of a spacious building on the exact location from which the products of the concern are shipped today throughout this and foreign countries.

Of all the devices designed to provide protection against injuries caused by falls, American Safety Treads are acknowledged by architects, engineers, casualty insurance companies, and users as being without an equal, being adapted for use upon inner and outer steps or stairs of granite, marble, cement, slate, iron and wood; upon thresholds of doors and elevators, fire doors, inclined passages, vault light borders, granolithic walks, ship ladders and car steps. They are fireproof, noiseless, clean, neat in appearance and protect the step to the extreme front edge.

Over 10,000,000 square feet are now in service on the stairs of industrial buildings, bank and office buildings, department and other stores, courthouses and other public institutions, colleges, schools, hospitals, railroad stations, subways, powerhouses, etc.

Mason Safety Treads have been tested and fully approved by the Underwriters' Laboratories, of Chicago, the official testing laboratory of the leading Accident Insurance Companies of America, and have been recommended and specified by leading architects and engineers of the country for thirty-five years.

The production of the American Mason Safety Tread Company is not exclusively devoted to stair treads, however, as a department in which composition flooring is manufactured is today one of its business units. Henry C. Delano is president, Harold A. Welcome, vice president and general manager; William A. Lamson, treasurer; and Haven G. Hill, clerk. The concern employs forty-five operatives.

THE STOVER & BEAN CO.

The original unit of the Stover & Bean Co. was established in Haverhill, in 1869, by Joshua M. Stover, and in 1893, the concern moved to

Lowell, where it leased space in the Harris Building, on Perkins Street. Outgrowing these quarters, it acquired several floors of the C. I. Hood Building, on Thorndike Street. The rapid development of the business was brought about mainly by the forming of a partnership between Mr. Stover and Daniel F. Bean, the latter having had a wide selling and manufacturing experience. With the retirement of Mr. Stover in 1909, the business was incorporated and became known as the Stover & Bean Co. Mr. Bean is the inventor of a health shoe for men, women and children, and while not actively engaged in the business at the present time, he enjoys the satisfaction of knowing that the principles which characterized his business life are being carried out by his sons, Ralph M., H. C. and H. A. Bean, who are now conducting the enterprise.

THE LOWELL WASTE COMPANY

In 1893 the Lowell Waste Company was incorporated, with capital of $40,000, and is engaged in the production of cotton waste. Mabel A. Goodall is president and Josiah Butler, treasurer of the corporation.

THE COURIER-CITIZEN COMPANY

When you consult a telephone directory you examine the product of a Lowell enterprise, as all of the directory publications of the New England Telephone & Telegraph Co. come from the presses of the Courier-Citizen Co.

Every telegraph blank used east of the Mississippi River by the Western Union Telegraph Co. is prepared by the Lowell concern, whose orders from this public utility corporation call for millions of blanks each year. The bulk of the printing requirements of the American Telephone & Telegraph Co., of New York, the Union Carbide Company, of New York, as well as those of numerous other internationally known enterprises are executed by the Courier-Citizen Co. It is a venerable concern, its origins lying far back in the nineteenth century, when, in a small way, job printing plants were established in connection with the old Lowell *Courier* and the old Lowell *Citizen*. They were brought together in a merger, in 1895, after a separate existence of some thirty years.

For a long time the plant was housed in an upper floor of the Parker Block in Middle Street, where it expanded until all the available area there was occupied, and in 1920, when more space was required, it was found in one of the larger mills which had previously served as a unit of the Bigelow-Hartford Carpet Company's property, just off Market Street and on the banks of the Dutton Street canal.

In 1928 the concern began the occupancy of one of the mill structures formerly owned by the Hamilton Manufacturing Company of Jackson Street. Alterations and improvements were made to the building which it is expected will care for the growth of the business for some years to come.

The plant is filled with the most modern printing machinery, including a battery of huge book presses adapted for the handling of the largest printing jobs, such as magazines and directories, that require the production of a great number of pages at each revolution. Nothing has been omitted which is necessary to the handling of large contract work from the composition of the type to the binding and delivery of the finished product on the loading platform alongside the spur track outside the plant.

For many years the Courier-Citizen Co. has printed the *Baseball Magazine.*

In order to obtain and execute contracts of the magnitude mentioned, it has been necessary to make the plant one of the major printing establishments of the country—and such at present it is—operating night and day for a considerable part of the year, and steadily expanding as the pressure increases. The company's specialty is high-grade commercial work, efficiently produced with the maximum of speed consistent with due care for accuracy such as corporations of such size and importance as its present clients justly demand. Telephone directories, which have been the company's principal specialty for a generation, naturally impose a requirement of mechanical accuracy surpassing that of almost every other grade of work, and the most exigent care is required to keep the percentage of error chargeable to the printer at an irreducible minimum.

The original company owed its inception and earliest success to the energy, foresight and unconquerable enthusiasm of the late Harry B. Rice, long treasurer of the concern, and to the wise management of the late Peter W. Reilly, his associate, who was regarded as one of the best practical printers in the country. Walter B. Reilly is now in direct personal charge of the details of this great and growing enterprise and William G. Spence is the treasurer. Don L. Overlock and Peter W. Reilly, Jr., hold important executive positions. Philip S. Marden is president and Robert F. Marden is secretary of the corporation, which has capital of $300,000.

The intricacy of the business due to its expansion to such unforeseen proportions, led, in 1916, to the separation of the job printing from the newspaper publishing activities and to the formation of two distinct companies, where one had previously handled the dual business in a single organization. The job printing plant has retained the original name—The Courier-Citizen Company—and it takes what it believes to be a proper pride in the development of what is today one of Lowell's major industries. Upwards of 400 operatives are employed.

THE PRATT & FORREST COMPANY

In 1896 there was formed the Pratt & Forrest Co., which absorbed the old-established A. L. Brooks Company, Wm. Kelly & Son, Hibbard & Smith, and the Lowell House Finishing Company, the original partners being Capt. O. W. Pratt, who had been identified with the Amasa Pratt Company for seventeen years, and C. M. Forrest, who had been connected with the firm of Burnham, Forrest & Davis, of which his father was a member. In 1910 the company was incorporated with William D. Pratt as president, Eugene C. Dunbar, vice president, and C. Marshall Pratt, treasurer and general manager.

In 1922, the growth of the business was such that physical expansion of its property became imperative, and a large tract of land was purchased, along with spur tracks and water rights extending 1,000 feet along the canal. This increase permitted the establishment of one of the most modern lumber yards in the country with all the machinery necessary to its operation, and with all the room required for the storage of immense quantities of lumber, ranging from huge rough timber to the finest of interior finish. Millions of feet of all kinds of lumber are maintained as working stock.

The concern has executed many large contracts, erecting among other structures the Wood Worsted Mill, in Lawrence, one of the largest plants of its kind in the world, and numerous churches, hospitals, courthouses, college buildings, bank structures, office and store buildings and high schools, and also turns out handy household articles.

It has capital of $100,000 and employs 100 operatives. The present officers are W. D. Pratt, president, Leon D. Abbott, vice president, and C. M. Forrest, secretary and treasurer.

The Lowell Shuttle Company was established in 1896, but was not incorporated until 1914. Engaged in the manufacture of enamelled bobbins, spools and shuttles, it employs upwards of fifty hands, and has capital of $75,000.

Frank J. O'Neil is president, and Charles O'Neil, treasurer.

THE U. S. BOBBIN & SHUTTLE CO.

In July, 1899, the U. S. Bobbin & Shuttle Company was formed, and represented the consolidation of several bobbin manufacturers. The main office is at 57 Eddy Street, Providence, Rhode Island, and at the plant on Rogers Street, Lowell, 400 operatives are employed in the production of bobbins.

The corporation has capital of $1,925,000. Luther C. Baldwin is president; Frederic C. Church, vice president; George H. Wilson, treasurer; Dana R. Crawford, sales agent, and William G. Hodges, purchasing agent.

THE U. S. MAILING CASE CO.

Founded in Windham, N. H., moving later to Lawrence, and locating in Lowell, in 1900, where it still occupies the original quarters, the U. S. Mailing Case Company, another product of W. S. Lamson, founder of the American Mason Safety Tread Company, today enjoys a patronage which might well be envied by concerns engaged in similar production. While the original product was a mailing tube, the company has from time to time developed new and unusual uses for this and other products which have been added to its line, with the result that a field much wider than ever dreamed of is now being served by the concern. Among the products being marketed are tin screw-top boxes, mailing cases, paper tubes and liquid mailing cases. Incorporated originally under the laws of the state of Maine, in 1892, the concern was later reincorporated under the laws of Massachusetts, and its present officers are: William A. Lamson, son of the founder, president, and Mary A. Lamson, treasurer. They, with Samuel A. Lamson, constitute the board of directors.

THE LOWELL EQUIPMENT MANUFACTURING CO.

A local industry which came into being coincident with the introduction of the pneumatic tire and whose growth has gone hand in hand with that of the motor car, is the Lowell Equipment Manufacturing Company, producing tire repair equipment for all types of pneumatic tires and tubes.

This thriving concern has been in business in Lowell for the past thirty years and was founded by James Norton. The business was purchased nine years ago, by the organization which now so successfully operates it. Tire repair equipment manufactured by the company is used in every civilized country of the world, and it is represented in all the principal cities in the United States and many foreign countries.

Its products are used in the plants of many of the major manufacturers of standard tires and tubes, such as the Goodrich Tire and Rubber Company, the Kelley-Springfield Tire Company, the Fisk Tire Company, the General Tire Company, and in the tire departments of all the federal bureaus, including the army and navy and Post Office departments.

Lowell vulcanizing equipment is designed by experts who thoroughly understand the problems of the tire repair man, and it is built with a view of making the first cost the only expenditure.

All the company's machines are made of semi-steel which makes possible an absolute water and steam-tight chamber. They are cast in one block, making unnecessary packing, bolts or other mechanical devices that might be affected by heat or cold.

The great accuracy with which the dimensions of the cavities are maintained permits the use of interchangeable reducing shells for all sizes and shapes of tires. By using the company's reducing shells repairs may be made with any one of its molds over a range of sizes and in every case the repair conforms perfectly to the natural form of tire.

The corporation has capital of $150,000, and employs fifty operatives. Samuel Scott is president, John H. Johnson, vice president, and F. W. Willard, treasurer and general manager.

THE A. J. FOSTER SHOE COMPANY

In 1903 the A. J. Foster Shoe Company removed to Lowell from Henniker, N. H., where it had been located for ten years. The enterprise was founded by A. J. Foster, in Haverhill, in 1880, and after successfully operating in that city for thirteen years, its activities were transferred to the New Hampshire town, and a decade later to Lowell.

It is engaged in the manufacture of women's medium grade novelty McKay footwear, and its Boston office is at 141 Lincoln Street.

A. J. Foster is president, S. A. Foster, treasurer, and L. F. Hale, clerk. The corporation has capital of $50,000, and employs 100 operatives.

THE LOWELL INSULATED WIRE CO.

In 1903 the Lowell Insulated Wire Company was incorporated and has grown steadily in the manufacture of insulated wire, now employing upwards of 100 operatives and operating 90 braiding machines. Reuben Dunsford is treasurer, and William A. Hogan, president, of this enterprise, which has capital of $75,000, and ranks as one of Lowell's dependable corporations.

C. H. McEvoy engaged in the production of cotton, worsted, linen and silk, telephone, electric, and lamp cords, wires and cables, utilizes 300 braiding machines.

The Nashua Manufacturing Company, of Nashua, N. H., bought the plant of the Suffolk Mills a few years ago, and employs 900 operatives in manufacturing cotton blankets, flannels and table felts. The plant is equipped with 260 cards, 40,000 spindles, 344 broad and 152 narrow looms, dyeing, bleaching and finishing departments, eight boilers and four water wheels, and also utilizes electric power.

The New England Southern Mills employ 350 operatives in manufacturing wide sheetings, the plant being equipped with 174 cards, 756 broad looms, twenty-five combs, 35,112 ring and 192 twist spindles, and three boilers, also using electric power.

THE WATERHEAD MILLS, INC.

In 1907 the Waterhead Mills, Inc., were incorporated with $500,000 capital to engage in dyeing, bleaching and finishing of corduroys and moleskins. The concern employs 300 operatives. Lincoln Clark is president and Otto Hockmeyer, treasurer.

BROMLEY SHEPARD, INC.

Lowell has been advertised far and wide by Bromley Shepard, Inc., manufacturers of the Bromley jersey frocks and allied products. The renown which has come to this Lowell concern is a personal tribute to Mrs. Bromley Shepard, whose skill as a designer and whose consummate business ability have brought her to the top of her profession.

Mrs. Shepard founded the business in 1906, and the corporation, which has capital of $50,000, employs seventy-five operatives. C. S. Rothleder is president, Lillian Chaloux, secretary, and Mrs. Bromley Shepard, treasurer.

THE IDEAL COMB COMPANY

In March, 1908, the Ideal Comb Company was incorporated with Terrance F. Casey as president, and Hon. James B. Casey, former mayor of Lowell, as treasurer.

Since that year it has manufactured high-grade celluloid combs and has filled orders from every section of the country. The plant is fully equipped to manufacture any kind of a celluloid product, so complete is its machinery and so skilled are its workmen. Special inducements are made for ideas that can be turned into a product, which will utilize celluloid in its manufacture, the motto of this company being "If it can be made from celluloid we can make it."

The corporation has capital of $30,000 and employs 75 operatives.

J. E. CARROLL & COMPANY

The firm of J. E. Carroll & Company has been engaged in the manufacture of cylinder drying machines, jigs, dye kettles, etc., for the textile industry for over twenty years.

What is probably the largest drying machine in operation in this country—a product of the Carroll firm—is to be found in the plant of the Merrimack Manufacturing Company, of Lowell. It is equipped with 75 cylinders, and dries two strings of cloth 60 inches wide, of extra heavy material.

The concern recently completed contracts for the United Piece Dye Works and there is scarcely a finishing plant in the United States that is not equipped with Carroll machines. Recent installations include apparatus for the new $5,000,000 finishing plant of the Pacific Mills, at Lyman, S. C., for the new Arnold Print Works unit, at Adams, in this state, and for the finishing plants established by Homer Loring, of the United Merchants & Manufacturers, Inc., of Fall River.

SOME OF LOWELL'S OTHER INDUSTRIES

In 1910 the Northern Waste Company was incorporated and the plant is equipped with six cleaners and eight baling machines. F. C. McDuffie is treasurer and James J. White, president.

The Lowell Felt Company, which was incorporated in 1910, with capi-

tal of $25,000, manufactures wool felt, saddlery felt and buffing wheels. E. R. Libby is president, F. L. Smith, vice president, and W. D. Smith, treasurer.

The Lowell Silk Mills, a branch of the Newmarket Manufacturing Company, of Newmarket, N. H., manufactures broad silks and upholstery goods at its Lowell plant, which is equipped with 400 plain and 361 box looms, twenty warpers, 4,000 winders, and 1,440 copping spindles, and employs 400 operatives. W. M. Gallant is the local agent. In 1929 additional floor space was acquired at Lowell, and 200 looms were transferred from the Newmarket, N. H., plant, and fifty hands were added to the local payroll, bringing the total to 300.

The Albert B. Stanhope Company, established in 1913, produces cotton and silk twine cord and tinsel ribbon, the plant having 400 spindles.

The William Andrews Company manufactures cotton, woolen and worsted surgical socks. The enterprise is owned by William F. Regan.

The Brown Hosiery Company, owned by Royal P. White and H. W. Horne, and of which concern C. A. Hosmer is manager, manufactures men's seamless hosiery, and employs thirty-five operatives.

The Suffolk Knitting Company, owned by Frank, Nathan, Israel and A. Paul Cohen, employs 400 operatives in the manufacture of men's, women's and children's cotton, worsted and woolen sweaters, bathing suits, light-weight knitted cloth, cardigans, anklets, and wrists, and is one of the city's fast growing industries.

THE LOWELL PAPER TUBE CORPORATION

After thirty-six years' service in the U. S. Navy, Capt. William Porter White was retired, at his own request, on June 30, 1910, and in October, of the following year, he became interested in the Lowell Paper Tube Corporation, as its treasurer and general manager. For many years Captain White directed the concern, and upon his untimely death, his son, G. W. Blunt White, assumed the presidency and treasurership. A. H. Gildersleeve is vice president, and A. N. Taber is secretary and assistant treasurer. Following the liquidation of the Lawrence Manufacturing Company, Mr. White purchased one of the buildings, and moved the business there from its original location on Warren Street. He now divides his time between the Lowell plant and a similar industry located in Mystic, Connecticut.

THE GILET CARBONIZING COMPANY

In 1911, James Gilet and associates incorporated the Gilet Carbonizing Company removing from Woonsocket, R. I., where Mr. Gilet operated under the name of the Woonsocket Scouring & Carbonizing Company. Three years later, without a cent of capital, he rented the scouring and carbonizing department, of the River Spinning Company, in Woonsocket, where he operated under the name of Gilet Carbonizing Company, but in 1911, he equipped a plant in some of the buildings of the Middlesex Company in Lowell, which concern had ceased manufacturing. In the last six years, Mr. Gilet has almost doubled the equipment, and for over two years of that time the plant ran on an average of 117½ hours weekly. Recently, equipment for depainting wool and noils has been installed, and the Gilet concern specializes in sorting, scouring, carbonizing and neutralizing wool, noils, and waste.

James Gilet is president and treasurer of the corporation, which has capital of $30,000 and employs fifty hands.

SOME ENTERPRISES STARTED IN RECENT YEARS

In 1912 the Columbia Textile Company was incorporated and began the manufacture of cotton goods, and in 1913 the International Cotton Mills were established.

The Brookfield Woolen Company was incorporated in 1916, with $50,000 capital, and is engaged in the manufacture of men's woolens. A. Stevens is president, and R. B. Pawle, treasurer and secretary.

The E. J. Hylan Textile Company employs fifty operatives in the manufacture of worsted and woolen fabrics, the concern being owned by E. J. Hylan.

In 1917 the Lowell Top Dyeing & Print Works were incorporated with capital of $15,000 and have a capacity of 100,000 pounds a week in the dyeing of worsted tops and raw stock, and Vigoreaux printing. The concern employs fifty operatives, and its capital is $15,000. Charles Taylor is president, Joseph Peloquin, secretary, and Fred G. Leary, treasurer.

The Waterside Mills were incorporated in 1917 to manufacture corduroys, velvets and moleskins, and have capital of $100,000. They employ 200 operatives and specialize in the dyeing, bleaching and finishing of pile fabrics. J. R. Howlett is president and C. E. Hochmeyer is treasurer of the corporation.

In 1918 the Lowell Dye Works were incorporated, with $150,000 capital, since increased to $270,000, and are engaged in the dyeing and finishing of men's wear, dress goods, bolivias, velours, Jersey cloth, cotton piece goods, and cotton and worsted yarns. They employ upwards of 100 operatives. William L. Barrell is president, William A. Barrell, secretary, and Fred V. Hanson, treasurer and manager.

THE KNOWLTON & NEWTON COMPANY, INC.

The firm of Knowlton & Newton was founded in 1919 by Harry W. Knowlton and Wilmer Newton. The former was for many years associated with the Saco-Lowell shops, where he acquired an engineering experience and acquaintanceship among the trade which, combined with the practical mechanical knowledge of Mr. Newton, formed a combination that gave assurance of the success the concern has since enjoyed. The death of Mr. Newton temporarily dulled the roseate promise which the future held, but Mr. Knowlton was not dismayed and met the situation successfully. The Knowlton & Newton Company is today recognized as one of the leading engineering and contracting concerns in this state engaged in the manufacture of cotton and wool blowing systems, napping room and dust collection systems, dyehouse and vapor exhausting systems, ventilation and general mill work, copper dry cans, dry can machinery and color kettles, etc.

The corporation has capital of $40,000 and employs thirty operatives. H. W. Knowlton is president, Edwin R. Sparrow, secretary, and Joseph N. Leonard, treasurer.

THE DE CODY CORSET COMPANY

The De Cody Corset Company, which for several years was located at 184 Market Street, removed in 1919 to the old Ipswich plant, where it operates a complete and well equipped factory and sales office.

The corporation has long borne an excellent reputation as the manufacturer of custom-made corsets and surgical garments which are sold by corsetieres direct, throughout the United States. In 1928 it became affiliated with the Idalia Shoppes, Inc., which concern operates corset shops and agencies from the Atlantic to the Pacific, handling not only the De Cody products, but the Idalia line of made-to-order garments as well.

The latter are made by new and original methods and are equipped with the Idalia patent adjustable detachable shoulder straps.

The corporation has established distributing centers from Boston to Seattle, the headquarters for the New England territory being at 817 Blake Building, Boston. The Middle West territory is covered from the Cleveland branch; the Western territory from Kansas City, Mo., and the Pacific coast from Seattle, Wash.

The Idalia Shoppes, Inc., is a Massachusetts corporation with George R. Fisher, of Cambridge, president and treasurer, John Drew, of Lowell, vice president and factory manager, and Roland G. Houghton, of Littleton, clerk.

The officers of the De Cody Corset Co., Inc., are identical with those of the Idalia Shoppes, Inc. The former concern has capital of $100,000 preferred, and 7,000 shares of no par value common stock, and employs 600 operatives.

LOWELL CONCERNS OF THE LAST DECADE

In 1919 the Bofel Rug Company took over the plant of the Beaver Brooks Mills, and began the manufacture of cotton rag rugs. Charles S. Hobson is president, Harry K. Boardman, treasurer, and Max W. Fels, superintendent. Twenty-five hands are employed.

The same year the Churchill Manufacturing Company was incorporated, with $15,000 capital and produces cotton mercerized and silk tapes, H. W. Coburn being president, and C. W. Churchill, secretary and treasurer.

The Ames Worsted Company was incorporated in 1921, with $450,000 capital and the plant is equipped today with 5,700 twist and 10,400 worsted spindles, one boiler, and two water wheels. Weaving yarns are manufactured by 250 operatives. C. B. Stevens is president, and Ames Stevens, is secretary and treasurer.

THE CONANT, HOUGHTON COMPANY

In 1921, the Conant, Houghton Company, Inc., of Littleton, established a branch plant in Lowell. The parent enterprise was launched in 1882 by Waldo E. Conant and Daniel G. Houghton, as partners, and in 1914 the firm was incorporated under its present name.

The original plant consisted of about 7,000 square feet of floor space and since the founding of the company the area occupied has increased more than fifteen times. Enlargements were made in 1887, 1892, 1904, 1916, and 1918, and in 1921 mill No. 18 of the former Bigelow-Hartford Carpet Company's plant on Market Street, Lowell, was purchased, which added about 28,000 square feet of floor space.

The corporation uses as its raw materials cotton yarn, rayon and rubber thread which are manufactured into elastic fabrics, and its operations consist of bleaching and dyeing yarn and warping and winding preparatory to weaving, which is followed by an elaborate and detailed finishing process.

In 1927, an important merger of the Glendale Elastic Fabrics Company, the George S. Colton Elastic Web Company, the Easthampton Rubber Thread Company, and the Lowell and Littleton units of Conant, Houghton Company, Inc., under the name of United Elastic Corporation was effected, and spelled stability in production, sales and employment.

Approximately 1,000 are now employed in the Easthampton units of the United Elastic Corporation, and 300 in the Littleton and Lowell units.

Judge Edward I. Shaw, of Northampton, is president, William L. Pitcher, of Easthampton, is treasurer, H. W. Conant, assistant treasurer, William Astill is plant manager, C. A. Richmond directs the chain and variety store business at the George S. Colton unit; Mr. Pitcher, at the Easthampton Rubber Thread Company plant, and George W. Astill at the Littleton and Lowell units.

SOME INDUSTRIES OF THIS DECADE

The Ingham Worsted Company, which was incorporated in 1923, with capital of $100,000, for the manufacture of worsted weaving and knitting yarns, is equipped with 1,600 twist and 2,800 worsted spindles. Mark Ingham is president and treasurer, Edward Hoyle is vice president. The concern employs seventy-five hands.

In 1923 the Lees Textile Company, Inc., was formed, with $50,000 capital to manufacture tinsel ribbons, cords and narrow fabrics. It employs thirty-five to fifty operatives. C. L. Haynes is president, L. A. Werner, treasurer, and William Lees, vice president.

In 1924, the Royal Worsted Mill was incorporated with $300,000 capital to manufacture worsted serges. The company employs 150 operatives, is equipped with 5,400 worsted spindles and twenty-four broad looms. J. P. Stevens, Jr., is president, Abbot Stevens, vice president, and Ames Stevens, treasurer.

In 1925 Kraft Knitters, Inc., was established and became incorporated two years later. Emil C. Peeson is president, and A. R. Campbell, treasurer. The concern manufactures children's sweaters.

The Lowell Bunting Company employs seventy-five operatives in the manufacture of bunting, the equipment consisting of 126 looms, 1,164 worsted spindles and 500 twist spindles, one boiler, and one water wheel, and the concern does its own dyeing, bleaching and finishing.

For several years past the Uxbridge Worsted Company has operated a branch plant in Lowell, under the name of Deavitt Manufacturing Company, where 150 operatives are employed, and where men's wear worsteds are produced. The unit is equipped with 120 narrow and seventy-four broad looms, and 200 twist spindles.

In 1927, the Atlas Plywood Corporation, of Boston, acquired the plant and assets of the Otis Allen & Son Company of Lowell and Lawrence, and now operates these units at full capacity.

The Whitall Manufacturing Company, engaged in producing cotton and silk underwear, operates full time days and employs a part of its force on night shifts.

LOWELL'S INDUSTRIAL CREDIT FUND

New concerns established in Lowell in 1927 and 1928 afforded employment of 3,176 additional persons.

Another local outstanding achievement of 1928 was the raising of an industrial credit fund for Lowell. Credit amounting to $300,000 was

secured through the Chamber of Commerce, enabling that organization to save one concern for Lowell, which had an attractive offer from Akron, O.

This fund also enabled another Lowell company to meet the demand of increasing orders for which there was no ready cash available.

A further achievement was the saving for Lowell of a refrigerator company which had purchased the business from the Saco-Lowell shops, and which had contemplated removing from the city.

INDUSTRIAL PROGRESS OF 1928

In 1928 the Long Life Webbing Company, capitalized for $75,000 and of which E. Weintraub is president, began business in one of the idle plants formerly occupied by the Hamilton Manufacturing Company, and now occupies 33,000 square feet of space, and operates 100 looms in the production of elastic webbing, employing 100 operatives; the Model Shoe Company purchased one of the units of the Ipswich Mills, the same year, and is employing 500 operatives in the production of shoes; the Bon Ton Shoe Company took over the factory formerly used by the Laganas Shoe Company and employs 325 men and women; the Plymouth Counter Company, owned by W. F. and John Herlihy, began the occupancy of 15,000 square feet of floor space in another unit of the Ipswich plant and engaged in the production of fibre and leather shoe counters; the Hope Company, inaugurated the manufacture of rubber products; the R. E. Goodman Company commenced the production of furniture novelties, and now employs seventy-five hands; the Bay State Rug Company leased space in the plant of the Shaw Stocking Company and began the manufacture of rugs; the Kalix Cup Company removed from Chelmsford to Lowell, has capital of $250,000, and employs seventy-five operatives; the Lowell Specialty Company began the manufacture of juvenile furniture; the Lowell Machine Company commenced the production of apple-corers and the Underwrap Company started the manufacture of rayon undergarments for women, and employs forty operatives.

The same year, Charles and Moses Movsesian, of Haverhill, purchased two of the Ipswich Hosiery Company's mills, containing 70,000 square feet of manufacturing space, and are employing 1,000 hands at the Lowell factory, with an annual payroll estimated at $500,000, the concern being the largest of ten shoe companies operating in Lowell.

The Watson-Park Company, of Boston, manufacturer of dyestuffs and chemicals, leased the plant of the Ballardvale Lithia Water Company at Lowell Junction that year, and remodeled the structure for its own use, removing its machinery from its former plant in Woburn to the new location. It has capital of $100,000.

The majority of these new concerns were brought to Lowell by the Chamber of Commerce, whose activities along the line of industrial rehabilitation have been marked.

Lowell continues to have and enjoy in the Merrimack Manufacturing Company one of the country's most successful textile corporations. Its payroll numbers 2,300 men and women, and only recently the company announced the first expansion in local textile circles in many years, when it made public its plans for the erection of a new weave shed at a cost of approximately $60,000.

The return of the Lawrence Manufacturing Company now operated by C. Brooks Stevens to a paying basis; the development made by the

Nashua Manufacturing Company in the old Tremont and Suffolk textile plants, where 700 now are employed; the installation of the Lowell Mills, Inc., in a portion of the Lawrence Manufacturing Company's plant, and the removal of the *Courier-Citizen* to the large unit of the Hamilton Manufacturing Company plant, which it bought were other outstanding events of 1928.

J. M. & E. M. Abbot Company, Ltd., took over that year another floor of the old Bigelow-Hartford plant for its business needs and installed additional machinery. The company employs 300 hands and in 1926 operated at 130% of its single shift capacity, and in 1927 at 104% of its capacity.

The Suffolk Knitting Company in the U. S. Cartridge plant expanded its manufacturing area and the Heinze Electric Company took over more floor space for its manufacturing program.

The Zip-On Manufacturing Company doubled the number of persons employed, the present force being forty, and it has operated three shifts for a long period. T. J. Howlett is president, J. R. Howlett, vice president, V. F. Hockmeyer, secretary, and C. E. Hockmeyer, treasurer, of the corporation, which manufactures children's leggings and sport blouses.

Much has been written and a great deal more said within recent years respecting the changes that have been made in the industrial picture in Lowell, but an unbiased computation of the assets and liabilities of the manufacturing life of the community shows a striking balance on the credit side of the ledger.

While the loss of large units such as the Saco-Lowell Shops, whose activities were transferred to another part of the Commonwealth, and the withdrawal of local operations by the Pepperell Manufacturing Company, were regretted by the citizens of Lowell, the diversification of local industry, due to the advent of new units during the past few years has been more striking than any development that has taken place in Middlesex County during the present century. The aggregate industrial payroll of 1928 was $1,500,000 larger than that of the previous year, and in May, 1929, the aggregate local industrial payrolls reached $3,197,476—representing a larger sum than had been paid in any month since the World War inflation period. Twenty-three new industries located in the city in 1927 and 1928.

In the former year the Harris Company, manufacturers of shoes; the Viscol Company, producers of Viscol art gum; the Riverina Mills, which took over the old Ravenshead Mill plant, and engaged in the manufacture of carpets; the Merrimack Paper Tube Company, which began the production of paper tubes; the Pollard Lunchcart Company, manufacturers of lunch carts; the E. L. Thomas Company, manufacturers of shoes; the Suffolk Knitting Company, producers of sweaters and bathing suits; the Middlesex Wood Heel Company and the Lowell Wood Heel Company, both of which engaged in the manufacture of wood heels; the Brown Daisy Mop Company, makers of mops; the Lowell Mills, Inc., manufacturers of men's and children's Jacquard golf and sport hose, with capital of $100,000, which acquired one of the idle units of the Lawrence Manufacturing Company, and of which Norman B. Reed is president and treasurer, and H. M. MacMillen, is secretary; and the United Novelty Company, manufacturers of women's shoes, all entered the city in 1927.

In 1928 and 1929 approximately 1,300,000 square feet of manufacturing floor space either were sold or leased for occupancy, the principal deals in this period being the acquisition of 215,000 square feet of area

in the Lawrence Manufacturing Company plant by the Hub Hosiery Mills, of Boston, and the acquirement of the old Bigelow-Hartford Carpet Company's mill by the Lowell Silk Mills, of about 110,000 square feet.

The mill space occupied by the group of new concerns locating in Lowell in 1927-29 is approximately as follows:

Harris Shoe Company, 5,000 square feet; Viscol Company, 75,000; Riverina Mills, 80,000; Merrimack Paper Tube Company, 5,000; E. L. Thomas Shoe Company, 20,000; Suffolk Knitting Company, 150,000; Middlesex Wood Heel Company, 10,000; Lowell Mills, 20,000; Lowell Wood Heel Company, 15,000; Long Life Webbing Company, 35,000; Laganas Shoe Company, 10,000; Kalix Cup Company, 20,000; Metal Refrigerator Company, 20,000; Hope Company, 10,000; R. E. Goodman Company, 30,000; Model Shoe Company, 75,000; Bay State Rug Company, 10,000; Majestic Shoe Company, 20,000; Lowell Underwrap Company, 10,000; Everpure Ice Company, 40,000; Lowell Ice Company, 20,000; Moth Aircraft Company, 110,000; Ornsteen Shoe Company, 15,000; W. J. Graham Company, 10,000; Lowell Silk Mills, 110,000; Hub Hosiery, 215,000; Battery Containers, Inc., 30,000; Morse-Coburn Company, 22,000.

THE MOTH AIRCRAFT CORPORATION

In November, 1928, the Moth Aircraft Corporation established its plane factory, adjacent to the Lowell Airport, and installed machinery for the manufacture of its machines, the initial output being one plane a day, which capacity it was anticipated would be doubled.

Following a survey made by the company's engineers, it was decided to select Lowell in preference to other locations as the place to engage in plane manufacture, because of the supply of skilled woodworkers and mechanics which was found to be second to none in the state.

The buildings taken over by the concern were formerly occupied by the United States Cartridge Company and contain 90,000 square feet of manufacturing space. Four hundred employees are carried on the rolls.

The Moth concern holds the exclusive contract license of the de Havilland Aircraft Company, Ltd., of England, for the manufacture and sale in the United States for a period of years of the famous "D. H. Moth" plane. The company is 100 per cent owned and managed by Americans, but has available the experience of the engineering and technical force of the English concern, which is one of the oldest and most successful airplane units in the world.

The present need and great future of a light plane in the United States is universally recognized, but owing to the lack of a simple and cheap motor American manufacturers have been handicapped in entering this field. In England, however, this development began a half dozen years ago, with the result that several English companies have developed excellent light planes and engines and are, therefore, several years ahead of America in this particular branch of the industry.

The "D. H. Moth" plane has folding wings, enabling it to be stored in an ordinary garage. There are more Moths flying today than of any other corresponding make. They have a patented "slot" on the wing which helps them to regain a normal position after any mishap in the air, and thus the danger of accident is minimized.

Of the biplane type, with a spread of thirty feet, and weighing 895 pounds when empty, the machine when folded is reduced to nine feet,

ten inches. With cockpits for pilot and one passenger and a compartment for baggage, it is useful not only for pleasure, but also for commercial purposes as a training plane, forest fire patrol, passenger carrying and mail service. Its small size enables it to take off from extremely small fields.

The de Haviland "gipsy" engine is an 85-100-horsepower air-cooled, in line, four-cylinder motor of simple construction. At cruising speeds of 90 to 95 miles per hour, it consumes gasoline at the rate of twenty miles per gallon, while its high speed in this plane is well over 110 miles per hour; its initial climb is well over 800 feet per minute; and its oil consumption is very low.

In the 1928 annual King's Cup race of 1,100 miles around Great Britain, not only did a "Gipsy Moth" win the event out of a field of thirty-eight starters, and at an average speed of 105½ miles per hour, but six out of the seven first places were "Moths." A week later a "Moth" broke the world's light airplane altitude record by reaching over 21,000 feet, with pilot and passenger, and on August 17, 1928, another broke the world's endurance record for light planes by staying up over 24 hours, bettering by eleven hours the previous record; 96 gallons of gas were carried and only eighty-two were used.

The plane is standard training equipment for the British Royal, Irish Free State, Royal Australian, Royal Canadian, Royal Italian, Chilean and Finnish air forces; is standard equipment for the Air Ministry and flying clubs in eight nations of the world, and is extensively used in over twenty nations. The performance, reliability, and economy of the Gipsy Moth plane have been proved by over 5,000,000 miles of flying.

Minton M. Warren, the president of the corporation, has had wide experience in engineering and management. He was for several years with Stone & Webster and more recently was connected with the engineering department of Curtis & Sanger of Boston. The vice president was formerly superintendent constructor of aircraft for the navy in New England during the World War. Raymond B. Hindle is treasurer, and Walter F. Andrews, secretary.

In 1929, a portion of the box shop department of the Lawrence Manufacturing Company plant was purchased by a group engaged in the manufacture of artificial ice.

That year, the Newmarket Manufacturing Company of Newmarket, N. H., indefinitely closed its local plant there, and removed 200 looms to the three-story brick mill, adjoining the plant of the Lowell Silk Mills, operated by the parent corporation, and known as No. 1 mill of the Bigelow-Hartford group. The structure is 365 by 65 feet, and affords sufficient room for the employment of 500 additional workers.

THE HUB HOSIERY MILLS

Lowell was also the gainer in 1929 of the Hub Hosiery Mills, of Boston, whose officials decided to consolidate its two separate units, hitherto operated in Lowell and Boston, in the former city. The corporation purchased the two remaining vacant mills of the Lawrence Manufacturing Company containing approximately 215,000 square feet of space, and upon the removal of the machinery from the Boston plant immediately gave employment to 700 operatives, which total will eventually be increased to 1,000 hands, or more. The Hub Hosiery Mills began operations in 1920, and its sales that year aggregated $250,000. In 1929 they had reached the $2,000,000 mark.

The company has been engaged in the manufacture of hosiery and recently began the production of infants' wear; such as sun suits, etc. Its latest expansion marks a most progressive step in the development of this line and will mean a great deal for the industrial improvement of Lowell.

The officers are, president, Charles G. Squibb; vice president, Herbert Jaques; treasurer, Philip L. Reed; board of directors, Messrs. Squibb, Jaques and Reed and Governor Frank G. Allen.

BATTERY CONTAINERS, INC.

In 1929 Battery Containers, Inc., began the manufacture of automobile and radio battery boxes and other battery parts, in a part of the U. S. Cartridge Company's local plant.

The officers are, president and treasurer, R. M. Taylor, of Brookline; vice president in charge of production, John A. Lindenborg of Indianapolis; and assistant treasurer, Charles E. Robinson, of Brookline.

The story of the development of this new industry is linked with the inventions of John A. Lindenborg, a Swedish-American inventor of Indianapolis, who had been experimenting with his battery box press for some years. Of an inventive turn of mind, Mr. Lindenborg has in the past ten years manufactured many mechanical devices to speed up production and improve on the excellence of manufactured products.

The battery box press was his pet hobby and after convincing himself that it was capable of turning out what he considered to be a more durable battery box container than any then on the market, he came east and interested Mr. Taylor in his invention.

Executive Secretary Grasse of the Lowell Chamber of Commerce interviewed the inventor and the financier in Boston and induced them to come to Lowell to experiment with their product and after some four months trial they both decided to locate permanently and to manufacture this commodity in the U. S. Cartridge Company building.

The company has installed presses and machinery capable of turning out between 8,000 and 10,000 battery boxes a day and its immediate prospects after passing the most rigid tests, are that the industry will grow to large proportions.

In September, 1929, the Nightstyle Manufacturing Company, makers of shirts, signed a lease covering 20,000 square feet of floor area in one of the mills formerly occupied by the Appleton Company, and removed its machinery from Somerville, where it was established in 1926. It is now employing 150 operatives.

Edward H. Petit is treasurer and M. L. Hurowitz general manager of the concern, which in addition to manufacturing men's shirts, also produces pajamas.

In the fall of 1929 the Jackson Shoe Company was incorporated and leased 65,000 square feet of area in Mill No. 7, formerly occupied by the Hamilton Manufacturing Company, and with 350 workers embarked on the manufacture of women's shoes, adding about $500,000 a year to the payroll of the city of Lowell.

Following a merger effected with other shoe companies in the fall of 1929, the United Novelty Shoe Company moved into larger local quarters, thus increasing its floor space from 24,000 to more than 6,000 square feet, employing 800 operatives, an increase of 300, and manufacturing 7,000 pairs of shoes per day, instead of 4,400 pairs as previously. This

expansion increased the company's contribution to the industrial payroll by approximately $350,000 a year.

OTHER LOWELL ENTERPRISES

The Spindle City Brass Foundry owned by Wilbur J. McCrady is engaged in the manufacture of brass castings; the Robinson Foundry Company has capital of $50,000, and employs fifty operatives in the production of grey iron and machinery castings, Richard T. Robinson being president, Everett E. Tarbox, secretary, and James P. Robinson, treasurer; Rice & Company, Inc., employs thirty hands in the manufacture of iron and wire work, and has capital of $25,000, William H. Wilson being president, Margaret J. Flynn, secretary, and George D. Hawley, treasurer; the Upton & Gilman Machine Company owned by E. A. Jones and John C. Dow, manufactures machinery; Doherty Brothers, a firm comprising John F. and William C. Doherty, employ seventy-five hands in the production of grey iron castings; C. S. Dodge manufactures shoddy picking machinery and employs 35 operatives; the Lowell Felt Company, of which E. R. Libby is president, F. L. Smith, vice president, and W. D. Smith, treasurer, has capital of $25,000 and employs twenty-five hands in the production of sheet felt; the John Dennis Machine Company owned by Charles E. McCarthy, Jr., employs twenty operatives in the manufacture of hydraulic, celluloid and leather belting machinery; the Heinze Electric Company, has capital of $400,000, and employs 400 hands in the manufacture of ignition apparatus, Joseph A. Legare being president and secretary, and Hon. Butler Ames, treasurer; the Imperial Upholstering Company, of which Irving A. Towle is president, Frank H. Emmons, vice president, Harry Fox, treasurer, and A. Goldberg, secretary, has capital of $450,000 and employs 160 hands in the production of upholstered furniture; The Kimball System, Inc., has capital of $50,000 and employs thirty in the manufacture of commercial signs, E. L. Kimball being president, M. A. Fitzgerald, treasurer, and R. C. Macgrath, secretary; E. W. Hoyt & Company, owned by Mrs. A. D. Sargent, has long been engaged in the production of cologne and dentifrice; Hull & Company, Inc., employs 200 operatives in the manufacture of women's shoes, William L. Dustin being president, and Richard A. Hull, treasurer of the corporation; the Lane Shoe Company, capitalized for $50,000 employs 175 hands in the production of misses, and children's McKay shoes, E. H. Swain being president, S. D. Cole, secretary, and K. M. Lane, treasurer, of the concern; the Lowell Shoe Company, a branch of the M. T. Ornsteen Shoe Company, operates a plant in Lowell; the Walsh Worsted Mill, a subsidiary of the U. S. Bunting Company, is engaged in the production of worsted fabrics; and the C. V. Watson Company, of which Carlisle V. Watson is president and Ivan Small, clerk, employs 300 operatives in the manufacture of women's McKay shoes.

THE CHANGING INDUSTRIAL PICTURE

In recent years, Lowell has been in the midst of a period of change in industry.

Acting upon the request of the local Chamber of Commerce, the Massachusetts Special Commission on the Necessaries of Life made a study, in 1928, of living costs and related matters in Lowell, and it found that in May, 1928, $96.70 would buy in Lowell the quantity of necessaries that cost $100, according to the average for the state.

The industrial and other conditions are discussed at length in the report, with especial reference to the state of the textile industry, and the gradual growth of activity in other lines, and the commission emphasized that Lowell's "early development as a cotton manufacturing center was and to a large extent is the dominating influence in the life of the city. But it is significant to note that Lowell's manufacturing activities as a whole are very much more diversified than before the war when nearly one-half of its $14,500,000 payroll was distributed by cotton mills; in 1926 only about one-third of its $21,000,000 payroll went to cotton operatives."

It thus appears that as the chief industry declines, the other manufactures multiply and grow. The commission found that the citizens of the city had been patient in the midst of their difficulties, and that if the population of the city had decreased, it was not altogether because there had been a migration to distant points. It was in large measure accounted for by a movement to surrounding towns. The removal or liquidation of textile concerns left available for new uses large areas of factory space. Some of these have been already utilized. As the commission emphasized, the process of change is slow, and will not be completed in a day even with intelligent and energetic effort to hasten it. But it means a new Lowell in the years to come, a city of varied industries in which there will not be overmuch dependence upon a single manufacturing activity.

The figures quoted in the report are significant of what may be expected not only in Lowell but in other Massachusetts towns and cities. Here is the oldest manufacturing region of the United States. The world in which its people do business is very different from that which existed when commerce and manufacturing took the place of farming in giving southern New England and much of northern New England their commercial and industrial characteristics. They have survived many changes in the past and found themselves better off as the result. What is happening in Lowell justifies expectation that the process is to be repeated.

CHAPTER XXXIV

THE PHENOMENAL DEVELOPMENT OF INDUSTRIAL CAMBRIDGE

As the seat of Harvard University, Massachusetts Institute of Technology, Radcliffe College, three theological seminaries, and numerous private schools, the City of Cambridge earned the name of the "University City," and for centuries it has been internationally known as the great educational center of America, as well as the home of Longfellow, Holmes, Lowell, Higginson, Eliot and hundreds of others who have left their impress upon the literature of this nation.

Today, it is its factories, rather than its educational institutions, that render the city famous.

No other New England municipality has grown so fast industrially as has Cambridge in the past decade and a half.

Probably few if any manufacturing cities in any section of this nation have shown a greater industrial increase in a comparable period of time. In attaining a 300 per cent gain in manufactures in the short space of ten years; in becoming the habitat of upwards of 375 industrial plants, in which nearly 25,000 persons are employed who receive annually $30,000,000 in wages each year, and in producing commodities whose annual value is in excess of $175,000,000 a year, Cambridge has experienced a metamorphosis that characterizes it as as much of an industrial boom town as Akron, Ohio, or Detroit, Michigan, though a much more artistic municipality than either because of its unusually attractive Charles River frontage.

It has become the third largest industrial city in Massachusetts, and is pressing Worcester hard for second place.

Within an area of two square miles of Kendall Square, where the greatest manufacturing development has taken place, are located more than two hundred plants, whose invested capital exceeds $100,000,000.

Here the searcher of facts finds the homes of the largest manufacturer of soap in the world; the greatest producer of rubber clothing in the world; the largest manufacturer of mechanical rubber goods in the world; the largest plant in the world devoted exclusively to the printing of school and college text books; the greatest producer of writing inks, adhesives, carbon papers, and typewriter ribbons in the world; the largest plant in the world devoted exclusively to the manufacture of confectionery; a branch plant of the largest manufacturer of optical goods and optical machinery in the world; the largest producer of road paving plants in the world; the oldest and largest school supply house in the United States; the only industrial research laboratory of its kind in the country; the only manufacturer of railroad lanterns in New England; the warehouse of the largest manufacturer of cast-iron boilers and radiators in the world; the New England warehouse of the foremost producers of transmission supplies and of the world's largest producer of motor pulleys; one of the largest photo-engraving and electrotyping plants in the United States; the New England headquarters of one of the largest petroleum product

purveyors in the world; one of the largest manufacturers of laboratory equipment, of blackings, of valves, of pianos, of bridges, of wooden and paper boxes, in New England; three of the largest candy manufacturers in New England; one of the largest heavy hardware jobbers in the six north-eastern states; two of the biggest iron foundries, one of the largest book binderies, and one of the largest printing plants, in Greater Boston; the second largest New England plant of the Standard Oil Company of New York, and the plant of the third largest gas company, in the Commonwealth.

The Kendall Square section houses more than one hundred industrial establishments which employ upwards of ten thousand persons, forty of the total having more than one hundred operatives, while sixteen of the number are financially rated at $1,000,000 and more. Four other concerns are rated between a half million and one million dollars; eleven between $250,000 and $500,000; nine between $100,000 and $250,000, and fourteen others between $50,000 and $100,000. There are also in the same locality five distributing plants and warehouses operated by nationally famous corporations, and ten other distributing houses of metropolitan importance.

Between 1910 and 1920 fourscore buildings, costing more than $7,000,000 were erected in that section, including twenty industrial plants, involving the expenditure of upwards of $2,000,000 now serving as homes of plants which removed there from Boston, or other cities and towns. Five other Kendall Square concerns, older in years, spent in the aggregate more than $3,000,000 in new construction within that period. The total number of industries located in the area increased from a few more than a score to upwards of a hundred in the same period of time.

At the beginning of this century, East Cambridge factory sites were available at twenty cents a foot, while today the land there sells for $2. per foot.

SOME OF ITS EXTENSIVE FACILITIES

Few locations offer such favorable freight and trucking facilities as the city of Cambridge. The removal of the Boston & Maine freight terminal to East Cambridge tremendously increased the shipping advantages of the Cambridge shore.

The B. & M. terminal is now easy of access by truck for local shippers. The Boston & Albany freight terminal is also located in the center of this industrial community.

The tracks of the latter road cut the heart of industrial Cambridge, running the entire length of the district, with spurs and sidings serving warehouse and factory doors for full carload shipments. As the Boston & Albany connects on the Charlestown and East Boston ends with the Boston & Maine and with steamship lines to Europe, and on the Boston end with the New Haven road, Cambridge has in reality a belt line service.

The city's uncongested highways afford easy access from the factories to the entire Metropolitan district. Moreover, the Boston Elevated stations at Lechmere Square and Kendall Square, connecting with the entire subway, elevated and surface systems, furnish cheap and rapid transportation to workers in Cambridge factories living in other suburban communities.

These advantages are being more and more recognized by manufacturing concerns and account in a large measure for the phenomenal industrial development of the last fifteen or twenty years.

THE UNIVERSITY PRESS

It is appropriate that printing should hold the premier position locally in annual value of products, as it was in the old town of Cambridge that Stephen Daye set up America's first printing press, in 1639, from which the first books ever published in this country, were issued.

The initial product—the "Bay Psalter Book," was published in Cambridge, in 1640, and the volume passed through many editions in the United States, as well as eighteen in England, the last appearing in 1784. In Scotland twenty-two editions were printed, the first publication being in 1754. The Psalter enjoyed a wider circulation and attained a more lasting reputation abroad, than any American work, having passed through seventy editions altogether.

It was in 1663 that 1,500 copies of the famous Indian Bible, prepared by John Eliot, the apostle to the red men, and the first work of its kind in America, was published.

The University Press, the successor to Daye, may well be called the oldest industrial establishment in this country, since it is almost three hundred years ago that he started business.

The corporation is now experiencing its twentieth century rejuvenation, as in 1928 the assets of the University Press, then operated by John Wilson & Son, Inc., were acquired by Tolman Print, Inc., of Brockton and Boston, and the University Road plant of the former unit is now operated by the new owners under the corporate name of Tolman Print, Inc., University Press. F. Harold Tolman is president, George M. Rand, vice president and H. L. Brigham, secretary of the corporation, which has capital of $750,000 preferred, and 30,000 shares of no par common stock, and employs 225 operatives.

A PROMINENT CAMBRIDGE INVENTOR

Amos Whittemore, who, by his extraordinary invention for making cotton and wool cards, merits a prominent place among the first mechanics of his era, was born in Cambridge, April 19, 1759, and became a gunsmith. He employed such idle hours as he could find, in gratifying his mechanical propensity, and constructed a clock, made without a model; a machine equipped with dial hands and figures, designed to be placed at the stern of a vessel, for the purpose of measuring its speed, and a self-acting loom, for weaving duck, which, while embodying the basic principles of textile looms subsequently invented, was allowed to lie neglected and forgotten.

Becoming interested, with his brother, William, and five others, in the firm of Giles, Richards & Company he finally evolved, after months of weary labor, a machine which drew the wire from the reel, cut and shaped it, pierced the holes in the leather, and placed the staples firmly in the sheet, and bent the wire after it was placed—a revolutionary device, and for which a patent was granted him on June 2, 1797, with a renewal period of fourteen years on March 3, 1809.

A. H. HEWS & COMPANY

Cambridge has the honor of having the oldest pottery in existence in the United States—A. H. Hews & Co. The business was founded in Weston, in 1765, by Abraham Hews, and there is preserved to this day one of the journals of the founder, the particular volume beginning April 19, 1775—curiously enough the anniversary of the Battle of Concord and Lexington.

For a hundred and five years the business remained in its original location, where it passed through the hands of four generations, but in 1870 it was removed to Cambridge, where it has been located for the past sixty of the 165 years of its existence.

The early records of the concern indicate that the principal articles manufactured were bean pots, bread and milk pans, and teapots, and for many years the commodities were bartered in exchange for groceries, New England rum, and other products.

Until about 1865 common flower-pots were made by hand on a potter's wheel, propelled by hand or foot power, but machines supplanted the hand processes in many potteries about that period. By 1869 the Hews concern was turning out 700,000 flower-pots a year, and twenty-five years later its output reached 7,000,000 a year, to say nothing of jardinieres, cuspidors and umbrella stands.

One hundred and sixty five years after its formation the concern ranks as the largest producer of pottery in Massachusetts.

It has capital of $250,000, employs upwards of 125 operatives, and is managed by scions of some of the famous families of Massachusetts. Its president is Philip Cabot, its secretary and treasurer, Dunbar Lockwood, and these two with Lawrence Hemenway, T. J. Coolidge, and Leverett Saltonstall constitute the board of directors.

Joseph Hastings of Cambridge was granted a patent, on August 14, 1822, on a process for manufacturing isinglass, which resulted in his producing this commodity of a quality far superior to the imported goods.

THE SHAW FURNITURE COMPANY

The Shaw Furniture Company has the honor of being the oldest business that has operated continuously in Cambridge. It was established in 1780 by Jacob Foster & Son, who continued it until 1828, when the concern passed to Charles Foster. In 1833 it became Foster, Lawrence & Company and from 1856 to 1863 it was operated by Edward Lawrence in his name. In 1863, the enterprise was known as Braman, Shaw & Co.; in 1877 as Shaw, Applin & Co., and in 1887 as A. B. & E. L. Shaw, this firm being succeeded by the Shaw Furniture Company, under which it operates today.

The firms of Foster, Lawrence & Co., and Edward Lawrence employed convict labor at the Charlestown State Prison, but when Braman, Shaw & Co., succeeded to the business, the plant was removed to East Cambridge, and in 1886 it occupied the Geldowsky factory, employing at that time from 150 to 200 operatives.

From its beginning it has specialized in all kinds of special order furniture, and has furnished some of the finest clubs, lodge rooms and hotels in the country, including the Niagara Hotel at Buffalo, the Hotel del Coronado, at San Diego, Cal., the Imperial, Netherlands, and Savoy Hotels in New York City, and the Jefferson Hotel, of Richmond, Va.

The corporation has capital of $125,000, and employs 175 operatives.

A. B. Shaw is president, E. Lawrence Shaw, secretary, and Samuel Usher, treasurer.

LITTLE, BROWN & COMPANY

In 1784, Ebenezer Battelle opened a modest bookstore, on Marlborough Street, Boston, which is now that part of Washington Street that lies between School and Eliot. That little mart has developed into the world-

famous publishing house of Little, Brown & Company, whose Boston headquarters at No. 34 Beacon Street, formerly the dwelling of the Cabots, and whose plant, in Cambridge, represent what is perhaps the longest record of unbroken operations and continuous growth of any of America's book-publishing houses.

While the Beacon Hill dwelling, which was erected at a period when that section represented the very acme of Boston's wealth and culture, houses the main office of the concern, it was found several years ago that a spacious five-story annex in the rear of the house, originally erected to take care of the shipping department, was required for office purposes, and one story is given over to a lunch room and a rest room for the women employees, and all shipping is carried on at a warehouse, in Cambridge, built in 1920, adjacent to Little, Brown & Company's long-established Riverside Bindery, a two-unit plant, with an output of 8,000 books a day.

In 1787 Benjamin Guild bought the Battelle bookstore, and moved it to Cornhill, now Washington Street, north of School, and five years later Samuel Cabot acquired the business. In 1797 William P. and Lemuel Blake succeeded Cabot and began publishing as well as book-selling. There was no change in ownership for thirty years thereafter, but in 1827 Hilliard Bray and Company bought the business, the silent partner in the firm, whose name did not appear being Charles C. Little. Three years later the enterprise was moved to 112 Washington Street, which location afterward was numbered 254, and here it remained for seventy-nine years. In 1837 Charles C. Little and James Brown, the latter a member of the firm of Hilliard & Brown, who operated the University Book Store, in Cambridge, purchased the business, the firm name at the start being Charles C. Little and Company, but shortly afterward it was changed to Little and Brown, and in 1847 to Little, Brown & Company. In 1898 the publishing business of Roberts Brothers, of Boston, was purchased, and six years later began the development of the educational department, which specializes in supplementary reading and home economies, with a limited, high quality list, this bureau having been materially strengthened by the addtion of the educational publications of the *Atlantic Monthly* Press.

In 1909 the Boston office and sales department were removed to 34 Beacon Street, and in 1913, the business was incorporated.

Little, Brown & Co., has long ranked with the world's foremost publishers of the works of standard authors and books of history, biography, travel and belles-lettres. Perhaps no house has issued more of the works of famous American statesmen. In the earlier days the concern brought out the "Life and Works of Washington" by Jared Sparks, in twelve volumes; Sparks' "American Biography" in twenty-five volumes; the works of John Adams, Edward Everett and Daniel Webster; the Oxford Edition of Plutarch's Lives, which appeared in 1859 and Richard Soule's Dictionary of English Synonyms, which was issued in 1872. The publication of the works of the greatest American historian, Francis Parkman, alone would have made the firm famous, but other successful ventures—towards the end of the nineteenth century—included the issuing of Admiral A. T. Mahan's epoch-making books on sea power and the translations of the Polish novels of Henryk Sienkiewiez. The company's editions of Dumas, Daudet and Hugo have been accepted in England as well as in America as the standard English prints of these great French authors.

The house has been almost from its beginning the leading publishers

of law books in America, its imprint appearing on the legal works of such authorities as Chancellor Kent, Emory Washburn, Theophilus Parsons, Judge Story, Simon Greenleaf, Judge Thomas M. Cooley, John N. Woerner, Judge John F. Dillon, Victor Morawetz, Justice Oliver Wendell Holmes, Jr., Judge Emlin McClain, William W. Cook, and the several epoch-making treatises of John H. Wigmore. In 1922 it published Charles Warren's "The Supreme Court in United States History," which was awarded the Pulitzer Prize as the best book of 1922, covering the history of the United States.

The general list has grown greatly in importance during the past thirty years. Until 1896, when Sienkiewicz's "Quo Vadis" was published, the house had issued only a few titles in the field of current fiction. "Quo Vadis," which had a sale of more than seven hundred and fifty thousand copies, was the first of many best-selling novels to be issued by the company. The general list was greatly enlarged in 1898 when, by acquiring the publishing business of Roberts Brothers, the company came into possession of many books of widely recognized literary worth. Included in the list were Miss Wormley's wonderful translations of Balzac and Molière and the writings of such authors as Louisa M. Alcott, Edward Everett Hale, Helen Hunt Jackson, Laura E. Richards, Emily Dickinson, Susan Coolidge, Louise Chandler Moulton, Lilian Whiting, Annie Payson Call, and Mary P. Wells Smith. In 1902 it printed Sidney McCall's "Truth Dexter." The company has printed and sold nearly 4,000,000 copies of "Little Women," and the other Alcott books. Today, more than half a century since the original edition of Miss Alcott's most famous story appeared, she still ranks as the most popular world author of books for young people.

In recent years, the house has turned to publishing the works of many of the popular novelists of the day, including Jeffery Farnol, E. Phillips Oppenheim, Mary E. Waller, Eliza Calvert Hill, Mary Johnston, Major A. Hamilton Gibbs, Stephen McKenna, Owen Johnson, and A. S. M. Hutchinson, whose remarkable novel, "If Winter Comes," published in 1921, has been perhaps the most discussed book of this era. It attained a sale of 500,000 copies in America and England within a year of its publication, which is said to be a record of popularity on both sides of the Atlantic.

In 1923 it published Owen Davis' "Icebound," which was awarded the Pulitzer Prize for the best American play, of 1922, and in 1926 it issued "Craig's Wife," by George Kelly, which received the Pulitzer Prize for the best American play in 1925.

The varied character of the company's publications is illustrated by the fact that it includes the perennial best-seller, Miss Francis' "The Boston Cooking-School Cook Book," as well as many other important household works; the animal stories for the bed time hour by Thornton W. Burgess, the "Twentieth Century Uncle Remus;" Owen Johnson's famous Lawrenceville schoolboy series; and some fifty titles in the field of the drama. Its list is particularly strong in books for children.

An important forward step was made on February 26, 1925, when Little, Brown & Co., entered into an alliance with the book-publishing department of the Atlantic Monthly Company whereby Little, Brown & Co., became the publishers of all Atlantic Monthly Press books. In its eight years of book publishing the Atlantic Monthly Press had brought out upwards of 125 books, including "Theodore Roosevelt" by Lord Charnwood; "The Amenities of Book-Collecting," by A. Edward Newton;

"Revolutionary New England: 1691-1776," by James Truslow Adams, which was awarded the Pulitzer Prize for the best work in American history in 1921; "The Ladies!" and "The Gallants" by E. Barrington; "Letters and Religion" and other books by John Jay Chapman; "Memories of a Hostess" and "Barrett Wendell and His Letters" by M. A. DeWolfe Howe, which was awarded the Pulitzer Prize for the best work in American biography in 1924; "Life and Letters of Henry Lee Higginson" by Bliss Perry; "Pro Vita Monastica" by Henry D. Sedgwick; "A Late Harvest" by Charles W. Eliot; "My Dear Cornelia" by Stuart P. Sherman; and the three sea stories, by the late Charles Boardman Hawes,—"The Mutineers," "The Great Quest" and "The Dark Frigate"—which won the John Newbery Medal, in 1923.

Charles W. Allen, who became the first president of the incorporated company, and served in that capacity from 1913 to 1926, when he declined re-election, was connected with the house for fifty-seven years.

The present officers are Alfred R. McIntyre, president, Herbert F. Jenkins, vice president, James R. McDonald, secretary, and Ross Whistler, treasurer, and they, with Murray Brown constitute the board of directors.

The expansion of the company's business has been due in a large measure to the progressive policies of President McIntyre. The corporation has capital of $1,000,000 and employs upwards of 250 operatives.

The colophon of Little, Brown & Co., was designed in 1911 by T. B. Hapgood, of Boston. In a border surrounding the oak tree and the monogram, it bears a Latin inscription which is, freely translated, "It matters not how many you have, but how good they are." And "they," of course, means books. So although from the books published by the house during its long existence over fifteen hundred titles have survived, and appear in the current catalogue, the new book list of each year is evidence of the belief of the present management, as of its predecessors, in a publishing policy of "fewer and better books." In the conduct of a business built up on the soundest New England traditions, it has a keen sense of the importance and the power behind the printed word, and it endeavors to have the imprint stand today, as in the past, for the highest quality.

MANUFACTURERS OF THE EARLY NINETEENTH CENTURY

For a century and a quarter Cambridge has been more extensively engaged in the manufacture of soap than any other city or town in New England.

The business was begun by Livermore, Crane & Whitney, as early as 1804, their plant being located in a building in the rear of Main Street, where Mr. Livermore, the senior partner, carried on operations until he died, in 1862.

The building of pipe organs was begun in Cambridge as early as 1809, when William M. Goodrich, of Templeton, who had started the manufacture of these instruments in Boston ten years before, moved his factory to the corner of Fifth and Otis streets, and continued operations until his death, in 1833. He was succeeded by Stephens & Gaieti, at the same location, and later by George Stevens, who served as mayor of Cambridge, and who continued the manufacture of pipe organs until 1891.

In 1859 S. S. Hamill began the production of church organs, on Gore Street, where he remained until 1889, when he erected a new factory on Bent Street, near Sixth. He produced instruments which found their way

into churches in practically every state in the Union, and in Canada, New Brunswick, Nova Scotia, the West Indies, and Cuba.

THE NEW ENGLAND GLASS COMPANY

Approximately 112 years ago, or to be exact, in 1818, the New England Glass Company was incorporated and established a factory at Lechmere's Point, East Cambridge, with a capital of $80,000, the plant being at that time one of the largest of its kind in the United States. Two flint furnaces and twenty-four glass cutting mills, operated by steam, and a red lead furnace, with a capacity of two tons of red lead per week, enabled the concern to produce every variety of fine, plain, moulded, and the richest cut glass, including Grecian lamps, church chandeliers, vases, antique and transparent lamps for domestic supply, and for exportation to the West Indies, and South America. Virginia coal, New Orleans lead, Delaware sand, held no terrors to the manufacturers who found it necessary to import into Massachusetts practically all of their raw materials. The value of the annual products soon reached $65,000 and in 1823 attained $150,000. At that time the weekly production was 22,400 pounds and 140 workers were employed.

But this industry like some of the others referred to is no more. In its stead, however, have risen larger units, catering to present day demands.

C. J. PETERS & SON COMPANY

One hundred and eight years ago, the Boston Stereotype Foundry was organized. It had thirteen members, of which C. J. Peters was one. As time passed, Mr. Peters acquired the holdings of his associates, and in 1879, changed the name to C. J. Peters & Son. Stereotyping was very popular among the printers in those days, as it was the only means of duplicating type pages and costly engravings without incurring the expense of making duplicate originals. C. J. Peters & Son, at that period, were doing most of the work from Maine to New York.

When electrotyping was invented, the company was the first to adopt this method and for a long time it was the only electrotyping firm in Boston. The new process, which superseded stereotyping for finer work, was generally employed by all printers and publishers, as it enabled them to make duplicates of the finest kind of engravings, including wood cuts and fine type work.

Then the demands for original plates began to bring pressure, and C. J. Peters & Son installed an up-to-date photo-engraving plant. After the death of C. J. Peters, his two sons—C. J. Jr., and George E. Peters—managed the company which was incorporated in 1903. Since their deaths the firm has been operated by George E. Peters, Jr. C. J. Peters & Son Company has become renowned for its direct silverware plates. In the last few years the concern has devoted a large part of its plant capacity to four-color process work, and at present is serving the most prominent concerns in New England.

It also specializes in the highest quality plates for all manner of printing at its Cambridge plant, located at 13 Brookline Street. A Boston office is maintained at 110 High Street.

The corporation has capital of $50,000 and employs fifty operatives. G. E. Peters is president and treasurer, J. W. Doran, secretary, and Charles H. King, general manager.

CAMBRIDGE BEGINS THE BUILDING OF RAILWAY PASSENGER CARS IN THE THIRTIES

In 1828, Charles Davenport, then sixteen years of age, was apprenticed to George W. Randall, of Cambridgeport, to learn the woodworking end of the coach and carriage-making trade, and four years later Capt. E. Kimball purchased the Randall business, and, with two journeymen and four apprentices, began the manufacture of all kinds of vehicles, including sleighs, with Mr. Davenport in charge of operations. In 1834, he built the first omnibus ever produced in New England, and the same year Mr. Kimball entered into a contract to construct some four-wheel railway cars for the Boston & Worcester Railroad, each having a capacity of twenty-four passengers. They were the first cars ever designed with an aisle running from end to end between the seats. In 1836-37 Mr. Kimball built for the Eastern Railroad twenty cars, each equipped with four wheels, with platforms and doors at each end. Mr. Davenport became an active partner in the firm of Kimball & Davenport, and later was a member of the firm of Davenport & Bridges. He gained a place in the history of American manufactures as being among the first large builders of cars and as producing the first typically American railway passenger car.

C. L. JONES & COMPANY

The manufacture of soap was commenced at 172 Pearl Street, about 1828 by Charles Valentine, who originally slaughtered cattle and packed beef at that location. He added the production of soap, in order to employ the tallow which failed to find a ready market, and exported the product to the West Indies and to South America.

The history of the business from 1828 to 1845 is involved in obscurity, but in the latter year, Mr. Valentine arranged with Charles L. Jones, then operating a small soap factory, in Boston, to assume charge of the soap business at the Pearl Street factory, and the firm of C. L. Jones & Company was established, while C. Valentine & Company continued beef-packing at the same location. In 1850 when Mr. Valentine died, the factory was entirely given over to soap production, and two brothers of Mr. Jones became partners. The business grew to large proportions, and in 1854 the manufacture of candles was added, while frequent enlargements of the buildings were made. Upon the death of Charles L. Jones, in 1879, the business was carried on by Henry E. and Frank H. Jones, and in 1881, the candle-making end was abandoned.

In 1886 the factory was remodeled and then had a capacity of turning out 10,000,000 pounds of soap a year.

From 1829 until his death in 1893, Francis L. Chapman carried on carriage building, in Cambridge, and was succeeded by George O. Robbins and George M. Church, who formed the Chapman Carriage Company which specialized in producing the Chapman, Goddard and Stanhope buggies.

THE DOVER STAMPING & MANUFACTURING COMPANY

The Dover Stamping Company was founded in 1833 by Horace Whitney, in Dover, N. H., where he carried on a general store and tinware business for a number of years under the firm name of Horace Whitney & Co.

Early in life he conceived the idea of making tin covers by means of dies, these articles at that time being raised up by hammering by hand,—a very slow process.

It was not until 1847 that Mr. Whitney succeeded in producing dies that performed the work satisfactorily.

The business was carried along in a small way for a number of years and in 1857 the name of the concern was changed from Horace Whitney and Company to Dover Stamping Company. The principal part of the production consisted in stamping tin plates into tinware of all kinds, and a Boston office was opened, on Blackstone Street, in 1857.

During the Civil War the company furnished many tin cups, canteens, and knives and forks, for the Union Army, and in 1865 when it seemed desirable to locate the works nearer the Boston salesroom, a tract of land was bought in Cambridgeport, and extensive works erected, the first day's work being done in the new factory on June 16, 1866.

In 1870 the Boston office was moved from Blackstone Street to 88 and 90 North Street.

One of the principal products of the concern—the Dover egg beater —made the name of the concern famous. It was invented in 1857 by Timothy Earle, and was the first successful mechanical egg beater ever manufactured.

The company purchased the patents and exclusive rights for the production and sale of the beater and named it *"Dover."*

In 1871, the concern was incorporated, and in 1902 it was reorganized and the corporate name changed to Dover Stamping and Manufacturing Company. At that time the office and sales rooms were moved from Boston to the Cambridge factory. The business has gradually increased and its factory has been enlarged from time to time. The company is now the leader in the manufacture of gasoline and oil measures used in the automobile trade.

Horace Whitney died in 1883, and was succeeded by his son, Edward H. who died in 1906. He, in turn, was succeeded by his son, Horace E. Whitney, as president, and three of his sons are in the business at present representing the fourth generation from the founder.

The corporation has capital of $300,000 and employs upwards of 150 operatives.

Horace E. Whitney is president and treasurer, Carleton S. Whitney, secretary, and Louis S. Cleaves, sales manager, and they, with Allen F. Whitney constitute the board of directors.

CURTIS DAVIS & COMPANY

In 1835 Curtis Davis founded the firm of Curtis Davis & Company which was changed three years later when Alexander Dickinson became a partner, and the concern known as Davis & Dickinson came into being. In 1851, Mr. Davis purchased his partner's interest, and eleven years later James Mellen, son-in-law of Mr. Davis, became a partner in the firm of Curtis Davis & Company.

At that time the works had a capacity of three tons of soap per day, and employed ten operatives, with a weekly payroll of about $100.

In 1875 the concern brought out its popular and well-known brand of "Welcome" soap, which name it registered and copyrighted the year before, and in 1883 the firm adopted the policy of manufacturing that type of soap, and a few special brands of laundry soap, to the exclusion of all others, whereas before that time it had placed on the market upwards of 125 different brands.

Here one sees an early application of simplification in production, which has reached its widest radius since the World War.

That the company adopted a popular and business-like course is evidenced by the fact that the plan was soon taken up by all the leading soap producers of the country. Upon the death of Mr. Davis, in 1887, Edwin D. Mellen, son of James Mellen became a partner, and a glycerine department was added, also a machine shop where the concern designed, patented and manufactured its own soap-making machines. The plant eventually grew to occupy two acres, with a daily capacity of twenty tons of soap and 3,000 pounds of glycerine. The concern had capital of $350,000 and employed eighty operatives, the annual production in the nineties being valued at $600,000, while the plant covered an acre of ground, and had a capacity of 125 tons of soap in process at a time, the total annual output being 6,000,000 pounds. In 1898, the plant was acquired by Lever Bros. Company whose history appears later in this chapter.

JAMES C. DAVIS & SON

James C. Davis began the manufacture of soap, in Cambridge, in 1835, gathering the materials from house to house, a custom then prevalent in the industry. Five years later he was operating a large factory for that period, and in 1850 was the sole proprietor of an extensive manufacturing business at 204, 206 and 208 Broadway. In 1870 James H. Davis became a partner and the firm of James C. Davis & Son was formed. In 1891 the factory was burned, but was promptly rebuilt, and for nearly three quarters of a century the "James C. Davis Old Soap," and the E. A. & W. Winchester Standard Soap, which was manufactured by the same formula as that used by the old concern of E. A. & W. Winchester, established in 1814, were known in every New England household.

In 1894 the concern added a glycerine plant, which converted all the waste products and spent lyes into an article of commercial value.

William Whittemore, Jr., of Cambridge, received a patent, in 1839, on an improvement on the roller gin for ginning cotton.

THE KENNEDY, NOW THE NATIONAL BISCUIT COMPANY

Neither the memory of man nor the pen of the historian can definitely determine at what date the manufacture of crackers began in Cambridge, but Alphonso Mason, Samuel Estabrook, and Artemas Kennedy were numbered among the local producers of this commodity in the early years of the nineteenth century, the latter carrying on manufacture in Arlington, Westford and Milton, and developing the Kennedy cold-water cracker in the latter town.

In 1839, his nephew, Artemas Kennedy, began the manufacture of crackers by hand, using about four barrels of flour per day. He occupied a brick factory on Main Street, where he remained for six years, when he erected a frame house with a bakery adjoining, at 434-440 Massachusetts Avenue. Here he remained for ten years, and in 1855 introduced steam power into the factory. Upon his death in 1861, his only son, Frank A. Kennedy, succeeded to the business, and agencies were established in New York, Philadelphia, and Chicago, while the plant was operated night and day.

In 1869 the first reel or mechanical ovens were built, with a capacity of twenty barrels of flour per oven each day, and by 1875 the sales had increased to $360,000. That year Mr. Kennedy erected a modern factory, on Green Street, containing 20,000 square feet. He was the first to prepare Boston baked beans in hermetically sealed cans, and he shipped the commodity to all parts of the world.

In 1882 the F. A. Kennedy Company was incorporated, which concern operated until May 10, 1890, when the business was bought by the New York Biscuit Company which ultimately was absorbed by the National Biscuit Company.

At the time the New York Biscuit Company acquired the Cambridgeport plant, it had a capacity of 400 barrels of flour per day, and was operating one hundred wagons, and employing 650 hands.

Today, the National Biscuit Company operates plants in this state in Cambridgeport, Brockton, Fall River, Fitchburg, Lawrence, Lowell, Milton, New Bedford, Pittsfield, Springfield and Worcester and has capital of $85,000,000.

H. M. SAWYER & SON

In 1840, in a small frame building, in East Cambridge, William H. Pettingell and David Blodgett, formed the partnership of Pettingell & Blodgett, and began the manufacture of waterproof hats, and a limited quantity of oiled suits, the products being almost entirely sold to seafaring and fishing interests. Ten years later the concern moved to larger quarters, and in 1856 H. M. Sawyer entered the employ of the firm, becoming superintendent a few years later, and a partner in 1860, when Mr. Blodgett retired. The concern operated until 1868 as Pettingell & Sawyer. That year B. D. Moody, a competing manufacturer of oiled hats, located at Newton, became a member of the firm, and the name was changed to Pettingell, Moody & Sawyer. Two years later Moody retired and shortly after August 6, 1877, on which date the factory was completely destroyed by fire, Mr. Pettingell, then over seventy years of age, retired. The day following the fire work on a new plant was started, and, in 1883, Charles H., son of H. M. Sawyer became a member of the firm of H. M. Sawyer & Son, which was incorporated in 1895 under that name. On September 5, 1902, when H. M. Sawyer died he was succeeded as president of the company by his son, Charles H., and the latter's brother, Lawrence T. Sawyer was chosen treasurer, both holding these offices today.

Up to 1862 the oiled clothing produced was made from drills or jeans and of single ply, but H. M. Sawyer changed the policy that year by producing garments manufactured of two-ply material, and the first sale of the double-oiled clothing was made to Samuel Dale, of Boston, at $144 a dozen. Similar garments today can be purchased by the trade at $30 per dozen, thus indicating what modern machinery and methods have done to reduce costs. Practically all of the oiled clothing now produced here and abroad is of the two-ply material.

Following the Civil War the company's products found a ready market in interior cities, especially in the mining, lumbering, and teaming industries, as well as for general waterproof wear.

Within the past few years the company has extended its business by creating the oiled slickers which are manufactured in weights running from 20 ounces to five pounds.

In 1916, the machinery, merchandise, patents and capital stock of the Brunsene Company, a New York concern, capitalized for $50,000, were purchased from the Goodyear Rubber & Tire Company of Akron, Ohio, and the plant, then located in Asbury Park, N. J., was removed by H. M. Sawyer & Co., to Watertown.

The capital stock was increased to $100,000 and Howard M. Sawyer,

son of C. H. Sawyer, was placed in charge of the concern which has greatly increased its facilities, and whose products run into millions of yards annually, and are distributed throughout the United States, and in many foreign countries.

H. M. Sawyer & Son has capital of $500,000 and employs upwards of 300 operatives at its Cambridge, Watertown and Farley plants. C. H. Sawyer is president, R. U. Sawyer, vice president, H. M. Sawyer, secretary and L. T. Sawyer, treasurer.

In the forties was established the furniture manufacturing concern, which later became known as W. C. H. Badger & Company, owned by W. C. H. Badger and George F. Tyler. This company occupied a brick factory 200 by 50 feet, five stories high, with a 150-horse-power engine, and employed 125 operatives during the closing years of the last century.

JOHN P. SQUIRE & COMPANY

On April 30, 1842, John P. Squire and Francis Russell formed the partnership of Russell & Squire, and began a provision business in Boston, which was continued for five years, when Mr. Squire acquired the Russell interest. In 1850 the firm of John P. Squire & Company was formed, the partners besides Mr. Squire being Hiland Lockwood, and Edward D. Kimball.

The firm name remained unchanged until April 30, 1892, when the John P. Squire & Company Corporation was formed, W. W. Kimball, George W., Frank O., and Fred F. Squire, sons of John P., becoming partners between 1873 and 1884.

In 1855, the founder bought a tract of land, on Miller's River, in East Cambridge, and erected a slaughter-house, the nucleus around which the immense plant of today revolves.

Mr. Squire lived to see the business founded by him grow from the slaughtering of one hog a day to 6,000; the first year's business of $16,000 reach $16,000,000 annually; the small original area of land develop into twenty-two acres, upon fourteen of which stood fourteen buildings, one of them being six stories high; the crude ice boxes of the pioneer days grow to refrigerators requiring 37,000 tons of ice at a time; the adoption of a system of artificial refrigeration which occupied nine acres in area, with a capacity of refrigerating 12,000 hogs at a time; the erection of a chimney at the plant, higher than the Bunker Hill monument; the payment of freight charges amounting to more than $700,000 per annum and the employment of more than 1,000 men.

It was a far cry from John P. Squire's humble wheelbarrow, in which he delivered to purveyors of meat the carcasses of hogs slaughtered by him, when he started business to the time when he employed during the winter seasons upwards of 1,000 men in harvesting ice from the ponds of Middlesex County to meet his cold storage requirements. The present-day $3,000,000 concern known as John P. Squire & Co., employs upwards of 1,500 hands, in producing pork products, in the huge main plant, in Cambridge, and in its branch factories in Boston, Lawrence, Salem, New Bedford, Worcester, and Holyoke. The enterprise is now a part of the Swift interests and George H. Swift is president, H. J. Nichols, treasurer, and F. W. Crocker, secretary, of the corporation. The company's headquarters are in the Ames Building, Boston.

THE A. & E. BURTON COMPANY

In 1844 Messrs. Harvey and Burton established the business at 122-124 Harvard Street, now carried on by the A. & E. Burton Company, and fifty years later a business valued at $200,000 annually, had been created.

The corporation has capital of $100,000 and employs from forty to fifty operatives in the manufacture of brushes. P. H. Thayer is president and A. C. Lindgren, treasurer.

Associated with it is the Burton Boston Brush Company which is capitalized for $100,000 and employs fifty operatives in the production of paint brushes. Philip H. Thayer is president and treasurer. Both concerns maintain their Boston offices at 75 Pearl Street.

THE GEORGE G. PAGE BOX COMPANY

In 1844 George G. Page began the manufacture of boxes and packing cases on Magazine Street, Cambridgeport, all the work being done by hand. A year later he erected a small factory, at the junction of Hampshire Street and Broadway, the site now occupied by the Page Box Company, and when, in 1857, the plant and his adjoining dwelling were totally destroyed by fire, Mr. Page rebuilt the factory on a larger scale, installed machinery and a 30-horse-power engine. In the years immediately following cigar boxes became a prominent feature, extensions were made, and 100 operatives were employed. In 1873 fire destroyed this plant, but a new factory was built of brick, 130 by 50 feet, three stories high, and it was first occupied in July, 1874, the concern operating in the interim in the Batchelder, Moore & Co., plant, in East Cambridge.

In 1874 Wesley L. Page became a partner and the firm name of George G. Page & Co., was adopted. Four years later George G. Page retired, and in December, 1882, Ovando G. Page, who with his brother, Wesley L., had carried on the business, died, and the following March a corporation was formed, under the name of the George G. Page Box Company.

ELIAS HOWE INVENTS THE SEWING MACHINE, IN CAMBRIDGE

To a Massachusetts inventor, born in 1819, on a bleak and barren farm in the old Worcester County town of Spencer, who lost his job in a Lowell machine shop where cotton-spinning machinery was being manufactured and repaired, due to the financial depression of 1837, and who migrated to Boston and Cambridge, is due the invention of the sewing machine.

At eighteen years of age, Elias Howe found himself in the dirty, topsy-turvy machine shop operated by Ari Davis, in Boston, to which one of the capitalists of the Hub had resorted, accompanied by the inventor of a knitting machine, for the purpose of interesting the proprietor in the device.

"Why are you wasting your time over a knitting machine?" shrieked Davis, who was notoriously the noisiest man then living in Boston. "Take my advice, try something that will pay. Make a sewing machine," he added. "It can't be done," came the reply. "Can't be done?" Davis ejaculated, "don't tell me that. Why—I can make a sewing machine myself." "If you do," observed the capitalist, "I can make an independent fortune for you."

Probably Davis never again gave thought to the assertion that he could produce a sewing machine, but his words rang in the ears of Elias

Howe who had listened to the conversation, and from that moment his career was fixed.

His father had established a factory in Cambridge, where he carried on the splitting of palm-leaves and was engaged in producing fans.

Marrying at twenty, when he was just beginning to work out the basic principles of a sewing machine, and to produce the first models, the inventor was harassed in his efforts to complete the invention and at the same time provide for his rapidly increasing family until at length, as the story of his triumphs has been recorded in the annals of American invention, he dreamed the dream that ultimately brought him fame and fortune.

One night in his troubled sleep he was obsessed with the thought that he had been captured by a band of savages, who carried him as a prisoner to their leader.

"Elias Howe," roared the monarch, "I command you on pain of death to finish this machine at once." Cold sweat poured down his forehead, his hands shook with fear, his knees quaked, but try as he would, he could not seem to vision the missing element in the problem over which he had worked so assiduously. The dream was all so real that he cried aloud, and in the vision he saw himself surrounded by a group of dark-skinned and painted warriors, who formed a hollow square and marched him to the place of his forthcoming execution. Suddenly he observed that near the heads of the spears carried by his guardsmen, there were eye-shaped holes. He had solved in his sleep the secret he had groped for in his waking hours. What he needed to complete his invention was a needle with an eye near the point. He awoke, sprang out of bed and whittled a model, with which he brought his experiments to a finality in the attic of his father's factory.

But at the very zenith of apparent success, the fates conspired to thwart his endeavors, as the building was destroyed by fire, and all of his experimental models were consumed by the flames. For days Elias Howe wandered in the depths of despair until at length he thought of a former schoolmate, George Fisher, who had but recently become the beneficiary of a small inheritance.

Announcing his willingness to apply some of his easily acquired resources to what he considered a questionable financial venture, Fisher loaned Howe the sum of $500 and became a passive partner in one of the strangest adventures in the history of American invention, as under the terms of the agreement he obligated himself to take Howe and the latter's numerous family into the Fisher home and to feed and lodge the group, as well as to allow Howe the use of his attic as a workshop.

In building the second machine, Howe spent all the money advanced by his schoolmate, but in May, 1845, he declared it finished, although he did not patent it until the following September.

Setting up the device in a public hall in Boston, he finally induced a local tailor to operate it for about three times the prevailing wage. A gaping crowd came to see it, scoffed and departed and when he tried to induce the larger clothing establishments to use it the reaction of the tailors reverberated to Faneuil Hall.

But he found himself temporarily a prophet not without honor save in his own country, as his brother, Amasa B. Howe, marketed a machine in England. At the suggestion of the latter, the inventor sailed for that country, with his family, but a quarrel ensued at the end of eight months, and Elias Howe returned to the United States to take the poor debtors'

oath, and to find that his patents had been pirated during his absence. It was not until 1854 that his legal rights were fully established by the courts and that his original patent was declared basic. For fourteen years his income often reached $4,000 a week from the $25 royalty on every sewing machine that had been built which, in any way, infringed upon his patent.

Howe held that his rights were worth $150,000,000, and when, in 1860, he petitioned Congress for an extension of the original period, he asserted that up to that year he had received but $1,185,000 in royalties. Today, every sewing machine that operates in the world carries some of the basic principles of Howe's outstanding invention.

LYSANDER KEMP & SONS, INC.

For eighty-five years the firm of Lysander Kemp & Sons, Inc., has manufactured soap, in Cambridge. It was established by Lysander Kemp, in Lincoln Court, in 1856, and eight years later was removed to a larger building. In 1857 Aaron Hale became a partner, under the firm name of Hale & Kemp, but ten years afterward this concern was dissolved, Mr. Hale retaining the soap-stock trade, and Mr. Kemp carrying on the manufacture of soap. In 1872 the two sons of the latter—Horace G. and James H. Kemp—were admitted as partners, and on January 1, 1892, Lysander Kemp retired from the firm, and his sons continued the business.

In January, 1893, the factory was destroyed by fire, but was immediately replaced by a modern structure, 100 by 63 feet, three stories high, with an adjoining power house, and by 1895 the concern turned out 1,259 tons of soap-stock, 458 tons of soap, and 705 tons of fertilizer stock.

Today, the company has capital of $50,000 and employs twenty-five operatives. Frank W. Lyman is president, Henry P. Jacob, treasurer and Roger Upton, secretary.

In 1846 Andrew J. Jones began carriage building, in Cambridge, specializing in heavy wagons, and continued the business for more than fifty years thereafter.

HENRY THAYER & COMPANY

From a retail apothecary shop, where, in 1847, Henry Thayer began in a small way to manufacture fluid extracts, in a room at the rear of his store, to a four story structure, with basement, 80 by 60 feet, and an annex 60 by 40 feet, is the story of the present concern known as Henry Thayer & Company which has capital of $75,000 and employs from 50 to 75 operatives.

When larger quarters were needed a small two-story brick building was erected, but later the concern moved to the Douglass Block on Main Street, and shortly after John B. Putnam and Francis Hardy joined Mr. Thayer as partners. A brick laboratory was built on Broadway.

L. A. Putnam is president, Joseph Mahoney, secretary, and Joseph L. Sturtevant, treasurer of the corporation.

In 1848, B. P. Clark began the manufacture of confectionery, on Franklin Street, Cambridgeport, removing his plant to Main Street, in 1862, and erecting twelve years later a factory, at 443 Massachusetts Avenue, five stories high, and 75 by 55 feet in size. Later the firm of B. P. Clark & Co., was formed, Messrs. Edward C. Wheeler and W. F. Alley joining with Mr. Clark in the partnership. Fifty hands were employed.

THE BARBOUR STOCKWELL COMPANY

As the result of consolidations of several distinct business enterprises the Barbour Stockwell Company is now so constituted as to be the only concern of its type in New England, viewed from the point of diversification of manufactures.

In 1849, Denio & Roberts, established in Boston, the first company to build a machine for cutting crackers and biscuits and it was among the pioneers in developing the forerunner of the modern baking machine. After changing hands several times the company's assets were purchased by Messrs. Barbour and Stockwell, in 1886.

In 1858, there was formed the firm of Allen and Endicott, which ultimately developed into the largest company of its kind in New England. Engaging in general machine work, in a plant located at Main and Osborne streets, in Cambridge, the concern was succeeded in 1876 by Messrs. Morrill & Allen, and fourteen years later the assets of the unit were acquired by the Barbour Stockwell Company.

When the Cambridge street railway was electrified, Messrs. Morrill & Allen provided a large part of the track material, and the general excellence and precision in craftsmanship evidenced in this contract brought to the concern a vast amount of similar work from other street railway companies, which at that period began to spring up like mushrooms throughout the country. This led to the firm specializing in track work and it became a permanent and important part of the output. Today, the Railway Department of the Barbour Stockwell Company is devoted to the manufacture of switches, mates, frogs, coverings, and miscellaneous accessories for practically all the street railways now operating in New England, and for a large number in other parts of the United States.

When the business of Allen & Endicott was acquired by Morrill & Allen, the real estate remained in the possession of the former firm, and a part of the property was leased by the Walworth Manufacturing Company which operated it as an iron foundry. Upon the removal of the latter concern, to South Boston, in 1882, Walworth O. Barbour, at that time paymaster of the Walworth unit, joined with Messrs. Morrill & Allen in operating the foundry, and a general jobbing business in grey iron castings was begun, which has successfully continued to this date over a period of forty-eight years.

In 1890 these several companies were consolidated under the name of Barbour, Stockwell & Company and the Allen & Endicott realty consisting of two acres of land, with buildings thereon, was acquired at that time, and by purchase since then the area has been increased to three acres, now located in a triangle formed by Broadway, and Market, Clark, Hampshire and Portland streets, in Cambridge.

In 1893 the present Barbour Stockwell Company was incorporated, and upon the death of Mr. Barbour about twenty years ago, the managerial responsibilities of the concern devolved upon Fred F. Stockwell, who today is president, treasurer and general manager of the corporation.

In 1928 the Broadway Iron Foundry, which was founded in 1864, and which produced iron and brass castings, was purchased by the Barbour, Stockwell Company and was merged with and moved in its entirety to the plant of the latter concern.

The same year, the Blanchard Instrument Company, which had been acquired by the Barbour Stockwell Company five years before, was taken into the organization as a separate department. It had enjoyed a varied

ownership prior to its acquisition by the Barbour organization, but each successive proprietor had contributed vastly to the development and improvement of the Reliance line of tachometers, marine panels and other speed-indicating instruments, until it had gained a reputation second to none in the world.

In February, 1929, the Beaudry Company, formed by Alexander Beaudry, in 1885, to manufacture the Beaudry champion power hammer, invented by him, was acquired by the Barbour Stockwell Company. Mr. Beaudry had added the utility power hammer for lighter grades of work, and in the period just before the World War, a great demand arose for this type of special machine and taxed the resources of the Beaudry units to capacity. From the inception of the Beaudry concern the Barbour Stockwell Company has produced all the castings that make up ninety per cent of the finished hammers, and since the acquirement of the unit the new owners have begun developments designed to meet the demands of today and tomorrow in this field. In 1923 the Barbour Stockwell Company purchased the assets of the United Hammer Company, builders of the Dupont power hammer, and coupled with the Beaudry products, the Cambridge concern now possesses a line which in importance is surpassed by none in this field.

The present organization is divided into eight distinct departments, and in building on one of its principal slogans, "From your ideas to the finished product," the Barbour Stockwell Company, through its engineering and production departments is able to seize an idea or principle, translate it to a blue-print, and carry it through its mechanical evolutions, via the wood or metal pattern route to its own foundry for moulding, casting and rough finishing in grey iron, semi-steel, brass, bronze, aluminum, or special alloy, and on to the finishing and fitting in the machine department where all parts can be assembled and where the original idea takes a tangible form in a machine that functions efficiently. Following tests and such changes as are considered necessary, the completed machine can be knocked down, shipped, delivered, installed and started on the peculiar mission it was designed for.

The executives of the Barbour Stockwell Company have ever been cognizant that they were living and acting in an era of engineering advancement, and they early saw that the development of the aircraft industry, now in its infancy, was bound to demand better and faster engines and more advanced machinery for the production of power units, instruments, and accessories. They planned accordingly and today their engineering and research, pattern, foundry, machine, power hammer, instrument, and forging and heat treating departments are striving to keep up with the demands made upon them for products—a market now so heavy as to extend beyond the highest point of production reached by the concern even during the period of the World War.

They believe these demands of the aircraft industry merely reflect business conditions of the immediate and remote future, and serve as an index to the future industrial development of Massachusetts and New England along this and other lines.

Mr. Stockwell, who for more than forty years has been the managerial genius of the organization, and who is president and treasurer of the enterprise, is found daily at his desk as active and as prolific in ideas as he was the first day of his business career.

The Barbour Stockwell Company has capital of $250,000 and employs 360 operatives.

Associated with President Stockwell are his two sons, Howard A. and Ernest F. Stockwell, and Harvey F. Winlock, son of John P. Winlock, who for many years was foreman of the foundry, and actively identified with the management of the Barbour Stockwell Company.

THE RIVERSIDE PRESS

It has been said of the Riverside Press that it "sets standards of bookmaking as one of the fine arts."

In 1849 Henry Oscar Houghton, at one time mayor of Cambridge, and a resident of the city for nearly fifty years, founded the enterprise now known as Houghton-Mifflin Company, and opened an office on Remington Street, Boston, but the manufacture of books has always been carried on in Cambridge. The original printing plant, erected on the banks of the Charles, naturally lent itself to the adoption of the name of The Riverside Press, which it has borne for more than eighty years.

The original building, a three-story brick structure, 60 by 40 feet, was distinguished by dormer windows, which broke its pitched roof.

The present plant is located on a tract of land of about four acres, is equipped with the latest machinery and upwards of 900 hands are employed there. Edward R. Houghton is president, J. Duncan Phillips, vice president and treasurer and Roger L. Scaife, clerk.

The Houghton, Mifflin Company, which operates The Riverside Press, has capital of $2,580,000.

THE CARTER'S INK COMPANY

In 1858, William Carter, then a wholesale paper dealer in Boston, commenced the manufacture of inks as a side line, producing a combined writing and copying fluid of the gall and iron type. The commodity to which he gave the trade name Carter's Combined, not only produced satisfactory copies which could not be made by the ink then in general use for office work because it was not adapted to copying, but it flowed almost as readily as a writing ink. It marked an innovation in the history of American ink-making and instantly found favor with the trade.

At the close of the Civil War, John W. Carter, son of the founder, who had served three years in the Union army, entered the business, and at once devoted his entire attention to the development of the inks made by the concern. At the same period, J. P. Dinsmore became the pioneer salesman of the company's products, and during the next twenty-five years traveled from France to California in its interests. Increased sales led to the occupancy of a separate building on Broad and Congress streets, Boston, and following the great fire of 1873, which destroyed everything owned by the concern save the trade-marks and good will, the business was reestablished on Batterymarch Street, under the name of Carter, Dinsmore & Company, and when that factory was outgrown in a few years a removal was made to a new plant, which the concern erected on Columbus Avenue. In 1888, Mr. Dinsmore retired from the firm, and seven years later, John W. Carter lost his life by accidental drowning.

The business was then incorporated, under the name of The Carter's Ink Company, and the directors chosen were the three trustees of Mr. Carter's estate—Francis A. Dewson, who served as president until his death, in 1901; James R. Carter, who later became treasurer of the company, and Edward C. Burrage, the present secretary of the corporation. Richard R. Carter, the eldest son of the founder, became president upon the death of Mr. Dewson, and is today the chief executive of the concern.

In 1900 Charles B. Gordon, who began his connection with the company in 1893, was named as general manager, in which capacity he is serving today, and George R. Metcalf is vice president of the corporation.

When the Columbus Avenue factory was outgrown, the company erected a handsome modern plant on First Street, Cambridge—the first structure observed when crossing the Cambridge Bridge—and the two huge electric signs on its roof have become landmarks. This new building was occupied in 1909. On the top floor are the mammoth tanks, each holding 5,000 gallons, in which the pure nut-gall solution is mixed with the iron salt and other ingredients. The entire front of this floor is occupied by a suite of laboratories—the heart of the business—for it is here that the products are conceived and continuously tested—each ink undergoing nine rigid tests before being bottled.

On the third floor are huge storage vats with a total capacity of 60,000 gallons, where the ink remains long enough to settle out all sediment, after which the finished product is transferred by gravity to the automatic filling machines on the second floor. On these floors are also the paste and mucilage departments, the former being made in large vats and allowed to flow to the filling machines while still warm.

Throughout the plant every possible operation is carried on by automatic machines. There are devices which fill eight one-quart bottles simultaneously, and others which fill, cork and label small bottles. The battery of labelling machines has a capacity of 100,000 bottles per day. Gravity conveyors carry the products through the various operations, and even the covers of the boxes in which they are packed are nailed automatically. In the basement 12,000 boxes per day are made by automatic machines.

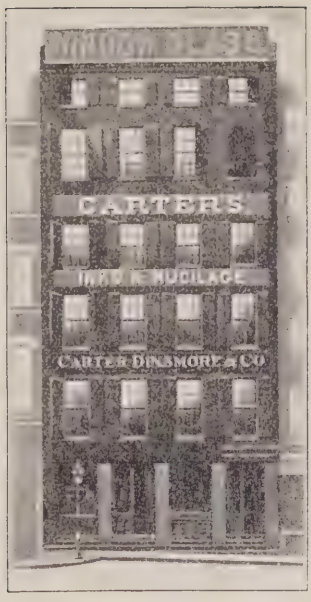
Although this factory is but twenty years old the company has added a large storehouse to the original building, and is today renting parts of nearby buildings. Further expansion will undoubtedly become necessary in the near future.

The company early turned its attention to products closely related to inks. Its Photolibrary paste, introduced in the '90s, when amateur photography first became popular, has become a standard throughout the world. Its Cico paste, mucilage, stamp pads, ink eradicator, show card colors, are as well known as the famous writing fluids, fountain pen inks and other inks. Altogether, nearly 400 separate formulas are used in the complete list of products, and the company is today the largest manufacturer in these lines in the world.

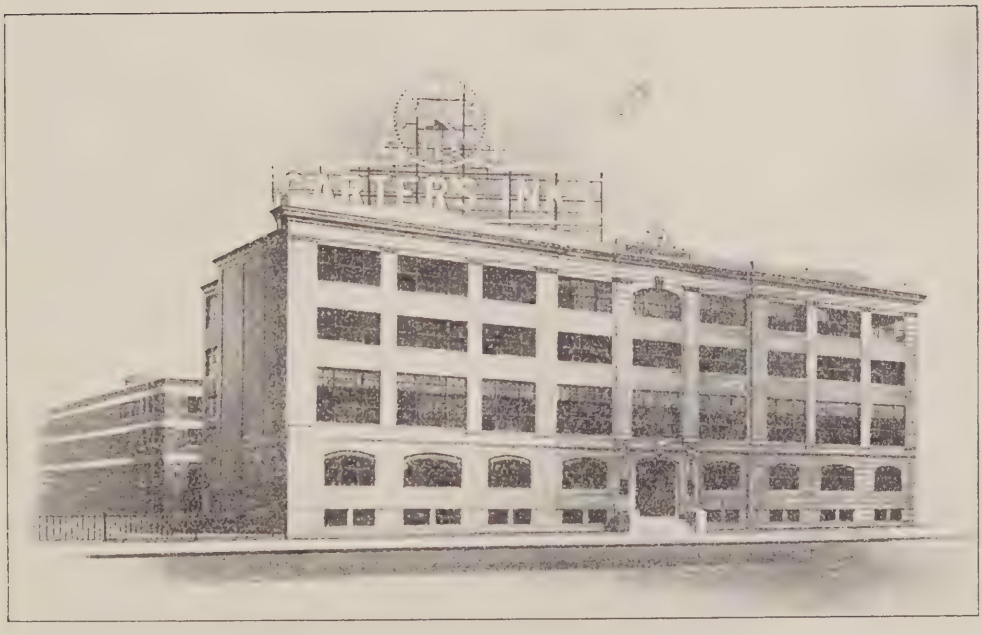
The steady growth in its ink business found The Carter's Ink Company, confronted in 1893, with the rapid increase in the use of typewriters and mechanical devices. This radical business change seemed for a time to threaten the usefulness of the ink bottle. The concern entered the carbon and ribbon business that year and took its stand with the pioneers in carbons and ribbons, standing now with the leaders in that field.

The old ink bottle on the shelf chuckled a bit at the time because the carbon and ribbon business was an addition, not a substitution. But, the ink bottle was to go on with its job as much as—even more than—before.

Then came the great development in fountain pens, bringing these commodities into the class of necessities. For a company that had specialized in the manufacture of the instruments of writing and expanded in that field, the next logical field for venture was of course in the realm of the fountain pen. A ready-made factory, with complete equipment and trained mechanicians was bought in 1925 and on the basis of that be-



WHERE THE CARTER'S
INK COMPANY STARTED
BUSINESS IN BOSTON



THE CARTER'S INK COMPANY PLANT, CAMBRIDGE, 1928

ginning, the Carter's Ink Company built its own distinctive program and its own distinctive pen, which is now made and marketed in all popular colors and sizes, with a flexible osmiridium point, which saves the fingers from the strain that comes from the use of a stiff unyielding pen point, and equipped with the Carter roche spring clip, which is the owner's protection against a frayed pocket.

Almost three quarters of a century, though not a long time as history runs, is a respectable period in the life of American business. Much has happened in the seventy-two years since the first drop of ink carried the name of Carter. When much happens, wide awake companies move forward on the crest of the happenings.

Perhaps one reason for the steady, conservative growth and expansion of The Carter's Ink Company is found in the spirit of the slogan which guides the organization, "There is nothing so good that it can't be better." It is that spirit that has brought out recently two new and outstanding inks, Blue-Rex and Ryto.

The company distributes its commodities to all quarters of the globe, from Spain to China and from Iceland to the Fiji Islands. Branch offices are located in prominent cities in the leading countries of the world, and a branch factory in Montreal occupies an entire six-story building.

No small share in the company's success is due to its constant and progressive use of advertising. Carter's Ink, the Inky Racer, the messenger boy and the funny little ink bottles are displayed in all leading magazines and in every stationer's window until they have become familiar to world shoppers.

The company has capital of $2,500,000, employs upwards of 500 operatives, and is the largest concern in the world engaged in the manufacture of inks, pastes, mucilages, and other similar products. The human element has always been emphasized by the company's executives, and today a clinic is maintained, in charge of a physician and surgeon and a full-time nurse. A recreation room, lunch facilities, indoor and outdoor athletic sports, and a liberal provision for the sale of the company's stock to employees, constitute other evidences of the progressiveness of the corporation.

Richard B. Carter is president, George P. Metcalf, vice president, Philip W. Carter, secretary, and Charles B. Gordon, treasurer.

WHEELOCK, LOVEJOY & COMPANY, INC.

When Wheelock, Lovejoy & Company, Inc., was founded in the year 1850, a large percentage of its products was imported from England and Sweden. As the manufacture of high quality steels was developed in America, however, the company commenced the merchandising of its own analyses under the brand name of "Hy-Ten." This trade-mark is now nationally known among the makers of machine tools, textile and shoe machinery, excavating equipment, electric motors and dynamos, etc. Large stocks of special analysis steels are carried in New York, Chicago and Cleveland, where the concern maintains branch plants, although the main headquarters and plant are located in Cambridge.

Here, alloy "Hy-Ten" special analysis steels ranging from .10 to 1.00 carbon content are constantly carried in stock for immediate shipment from a quarter inch to ten inches round.

The corporation has capital of $600,000 and employs seventy-five operatives.

A. Oram Fulton is president, Frederick H. Lovejoy, vice president, Frederick B. Lovejoy, treasurer, and I. N. Enyard, secretary.

THE RAWSON & MORRISON MANUFACTURING CO.

As early as 1835 the necessity for handling heavy weights by other means than manual labor forced itself upon contractors, bridge builders, and others, and as these industries early began to assume large proportions, inventors set to work to design and manufacture hoisting engines, Hittinger, Cook & Company of Charlestown being the pioneers in the field.

From their extensive shops was graduated George W. Rawson, a natural mechanic and a prolific inventor. Forming a partnership with Michael Hittinger, of the firm that had employed him, the firm began operations at 72 Main Street, Cambridgeport, and carried on a large business during and after the Civil War, producing annually about two hundred engines, ranging in price from $600 to $3,000 each.

Michael Hittinger, who became the senior member of the firm of Hittinger & Rawson, was an inventive genius whose portable and stationary engines, hydraulic presses, pumps, ice and tobacco machinery, and hoisting engines for discharging the cargoes of vessels, worked a revolution in many lines during the last half of the nineteenth century.

He conceived and perfected the idea of assisting the operations aboard merchant vessels, and, in 1869, placed a steam engine in the 1,200-ton ship *Pacific,* which condensed the water, hoisted the sails and anchor, pumped ship, and loaded and discharged the cargo. During his career he built more than 2,000 steam engines, installed upwards of forty sets of machinery for harvesting ice, and arranged mechanical devices in more than forty tobacco factories.

In 1884 John G. Morrison became the junior member of the firm of Rawson & Morrison, which succeeded Rawson & Hittinger, and a new plant was occupied at 29 Main Street.

The previous year Mr. Rawson had begun a series of experiments with a view to designing and manufacturing a steam shovel and apparatus adapted to the discharge of vessels engaged in coal transportation, and producing a practical device, it was made by the firm and marketed from Maine to California. Upon the death of Mr. Rawson, in 1893, the business was continued under the original partnership by Mr. Morrison, until May, 1896, when the Rawson & Morrison Manufacturing Company was incorporated, with capital of $75,000. A modern steel frame building, two stories high, 150 by 60 feet, was erected, and fitted with electric cranes and the most modern machinery and tools. For years the company designed, patented and produced hoisting engines, coal-handling machinery, boilers, stationary engines, electric hoists, fertilizer dryers, hydraulic pumps and presses, and special and general machinery.

The Mead-Morrison Manufacturing Company, which succeeded the Rawson & Morrison Manufacturing Company, is now located at 125 Prescott Street, East Boston, where 500 operatives are employed. The later history of the enterprise is carried in the chapter devoted to the industries of Boston.

In a building on State Street, known as Osborne's Mill, George W. Seaverns began the manufacture of piano actions, in 1851. Four years later, and again in 1874, production was temporarily halted by disastrous fires, and in the latter year, Mr. Seaverns leased a portion of the Greely Mill, and as additions were required he hired a number of adjoining structures. In 1889 the George W. Seaverns Piano Action Company was in-

corporated, with capital of $50,000, the founder becoming president, with Frank H. and Walter G. Seaverns, as directors.

THE ALVAN CLARK & SONS COMPANY

For upwards of seventy-five years, Cambridge has been celebrated for its triumphs in the field of telescope manufacturing, where the art has been developed to its highest degree. It is rather interesting to note that Alvan Clark, the founder of the business, was a portrait painter when he entered the mechanical and scientific field, although at one time he had been employed as a fine-line engraver.

In an article written by Prof. Simon Newcomb, that appeared in *Scribner's Magazine,* in 1873, the statement was carried: "When we trace back the chain of causes that led to the construction of the great Washington telescope, we find it to commence with so small a matter as the accidental breaking of a dinner-bell, in the year 1843, at the Phillips Academy, Andover, Mass."

George B. Clark, one of the students at that institution, gathered up the fragments of the bell, carried them to Cambridgeport, where he melted and cast them into a disc. In this work he was assisted by his father Alvan Clark, and the combined skill of the two resulted in a five-inch refracting telescope. Approaching the work with ardor, the senior Mr. Clark spent several years in manufacturing glasses of gradually increasing size. From England came the first recognition of his genius, the initial order for a telescope being received from Rev. W. R. Dawes, a leading amateur astronomer in that country. This sale was immediately followed by a request for a second instrument.

Receiving an order for a telescope for the University of Mississippi, Mr. Clark proceeded to build it, but the outbreak of the Civil War prevented its delivery, and later he sold it to the Chicago Astronomical Society. Mr. Clark was awarded the Rumford Medal for his approved method in locating errors and in eliminating them by the method of local correction.

About 1860 he moved his business from his Prospect Street home, where he had carried on the work, to a location at the foot of Brookline Street.

In 1862, with the aid of a newly constructed glass, he discovered the companion to Sirius, for which triumph he was awarded the Lelande Medal offered by the French Academy of Sciences.

Among the great telescopes made by the firm was the 26-inch Washington refractor, the 30-inch Pulkowa instrument, the 36-inch Lick telescope, and the 40-inch Yerkes refractor.

Alvan Clark died in 1887, and his son died four years later, following which a remaining son, Alvan G. Clark, carried on the business until its incorporation as the Alvan Clark & Sons Company.

It is now owned by C. H. Sawyer, and C. A. Robert Loudin is manager of the concern, which has a world-wide reputation.

THE STANDARD DIARY COMPANY

What a wealth of information covering the social, political, economic, financial, industrial and commercial fabric of the world is embraced within the covers of the countless diaries, on whose pages have been transcribed the daily happenings of kings, potentates, savants, authors and statesmen.

Difficult, indeed, would be the work of the biographer and the his-

torian were it not for the records of individuals who have methodically imparted to the blank pages of their diaries their goings and comings, their opinions on matters of momentous import, and the routine of their activities as they lived their lives day by day. The treasure houses of the Orient and the Occident reek with the records of those who wrought in bygone ages, and poor indeed would the world be today were it not for these resumes of men and women who transmitted, through the medium of the written word and in the form of a diary, the stories of their participation in some of the most momentous events in history.

While the commodities fabricated by the skilled artisans employed in the myriad of industries in Cambridge are distributed in every country on the globe, it is doubtful if there are any that embrace a wider field of dissemination than the Standard Diaries, which have been manufactured in the University City for eighty years, and which include hundreds of varieties, sizes, and bindings.

The Standard Diary Company has come to be known as an institution rather than as a mere manufacturing unit.

In 1850, Edwin Dresser and Eben Denton rented two small rooms, over a grocery store, on what was then Main Street, and is now Massachusetts Avenue, and began the manufacture of diaries and memorandum books. Mr. Dresser had previously been associated with Harper and Bros. of New York City, and with a book bindery, in Concord, and hence was familiar with the publishing business. The founders personally carried the paper they needed from Boston to Cambridge, ruled it themselves, and assisted the five persons they employed in turning by hand the printing presses they installed.

A copy of the first edition of the Standard diary is still extant. It is the type known as the "three-day" volume, and 2¾ by 4½ inches in size. The contents include an almanac, showing the hours of the rising and setting of the sun, the moon's phases, a yearly calendar, and the postage laws of the United States, the latter citing that "half ounce letters under 3,000 miles," will be carried for "3 cents if prepaid; 5 cents if collected on delivery," and that for letters transmitted over 3,000 miles the rate is doubled. At that period weekly newspapers were delivered, post free, in the county in which they were published.

As the business expanded, larger quarters were secured by the founders, and in 1857 an entire building was leased, at the corner of Main and Prince streets, and soon afterward was purchased. It served as the headquarters of the company until 1890, when the four-story brick plant, at 26 Blackstone Street, was erected by the company.

The advent of the Civil War gave a great impetus to the business, and a tremendous demand for diaries developed, not only from the soldiers at the front, but from those who remained at home and who wished to permanently record the important events of those stirring days. This was repeated even in larger volume during the World War, and almost countless are the khaki-bound Standard diaries scattered throughout the world, in which the authors have embalmed the permanent story of their experiences and achievements.

When Donald B. MacMillan, and his gallant band of explorers left Boston for the "Top of the World," the equipment included a substantial supply of Standard diaries, in which the records of that momentous journey were recorded.

A number of years ago occurred the death of a Mr. Crocker, of Somerville, a life-long diarist, and his son, Albion B. Crocker, in examining

these interesting records of his father's life, observed an entry in the diary for 1875 to the effect that five weeks previous, while on a trip to Maine, the diary fell into a lake, and was thought to be lost. Some weeks later it was recovered by a boatman, frozen in a cake of ice a mile away from the place it went overboard, and he returned it to the owner. Although the record was in pencil, its contents were still perfectly legible, and the diary is now, fifty-five years later, in excellent condition, showing no evidence of its aquatic journey.

The firm first conducted its business under the name of Edwin Dresser, and later as Denton & Wood, Mr. Dresser being a silent partner at that period. Then the name was changed to E. Dresser & Company, and, in 1873, with no change in ownership, the concern was incorporated as The Cambridgeport Diary Company, and, in 1906, thirty-three years later, while still under the same management, the corporate name was changed to The Standard Diary Company, under which cognomen it operates today.

In this long period of time a number of interesting personalities, well known in the business and civic life of Cambridge, were instrumental in the development and success of the enterprise.

Edwin Dresser was the dominating figure in the industry from its inception to the time of his death in 1915. His forceful character, sterling qualities and unusual business sagacity, were factors which enabled him to wisely determine the policies of the company for sixty-five years.

His son, Sumner Dresser, formerly a partner in the stationery firm of Winkley, Dresser and Company, of Boston, became associated with the Cambridge concern in 1890, as its sales manager, and, after the death of his father he was elected president, in which position he is continuing the sound business principles of his predecessor.

Albert S. Parsons, of Lexington, was treasurer from 1873 to 1917—a period of forty-four years. An early partner, Prentis Richardson, organized one of the first volunteer companies at the beginning of the Civil War, and went to the front as its captain, in 1861.

J. Augustine Wade, a life-long resident of Cambridge, was superintendent for more than half a century, and his record of seventy years of service with one company has rarely, if ever, been exceeded in the United States. He entered its employ as an errand boy in 1851, and at the time of his death in 1921, was still a member of the organization.

Edwin Dresser, now treasurer, represents the third generation of his family to be connected with the company, is a veteran of the World War, having served in France, and since his return he has been officially associated with the company.

Wallace R. Lovett, now vice president and general manager, came to the organization as treasurer in 1918, having had eighteen years of business experience with the Second National Bank of Boston and with Loring, Coolidge, and Noble, a prominent Boston firm of trustees and attorneys.

The management has always endeavored to secure the highest grade of workmen, and some of the present force have been associated with the company for periods longer than the lifetime of the average individual.

The corporation has capital of $250,000 and employs upwards of 100 operatives.

THE ALDEN SPEARE'S SONS COMPANY

In 1851 Alden Speare's Sons Company was established, and for many years operated plants in East Cambridge, Walpole and Fall River, with

general headquarters in Boston, where as importers, exporters and manufacturers of oils, emery, starches, and mill and laundry supplies, they employed in the aggregate between 400 and 500 operatives.

The activities are now concentrated in Cambridge, where every facility is employed in handling the company's commodities. The corporation has capital of $375,000, and is largely directed by descendants of the founders, who include Lewis R. Speare, E. Ray Speare, Alden Speare, and Henry I. Hall.

The present officers are: president and treasurer, E. Ray Speare; vice president and general manager, W. D. Stockbridge; secretary and assistant treasurer, Alden H. Speare.

WHITTEMORE BROTHERS CORPORATION

In 1852, two brothers, David and Joshua Whittemore, began the manufacture of what were then known as "shoe-stains"—products designed to treat leather footwear. Their sales were made solely in the shoe-making cities and towns of New England, and the firm found a ready market for all it could produce. The founders were succeeded by their sons, who firmly established the business, modernized and perfected the commodities, and when the third generation of Whittemores became identified with the concern, its position as the leader in its line in America had been definitely determined. They extended the area of distribution to all parts of the world.

Today, representatives of the fourth generation of the founders are devoting their energies to carry on, unimpaired, the Whittemore tradition of quality, integrity and reliability of the products. To the line of shoe polishes, pastes, and creams, the Whittemore Brothers Corporation has added Cleanall, designed to remove grease and dirt from all types of fabrics, automobile interiors, and tarvia or road grease from fenders of cars without injuring the varnish.

The corporation has capital of $400,000 and employs upwards of 150 operatives in its Albany Street plant. Carl T. Whittemore is president, Walter C. Pessils, secretary, and John Challis, treasurer and general manager.

THE CAMBRIDGE GAS LIGHT COMPANY

A persistent and growing demand for gas service in Cambridge resulted in an act being passed by the General Court of Massachusetts, and signed by Gov. George S. Boutwell, on March 15, 1852, incorporating the Cambridge Gas Light Company to manufacture and market gas, and from the seventeenth day of January, of the following year, when gas was first turned into the mains that were laid at that period, there has never been a day, hour, minute or second throughout a period of seventy-eight years that this company has failed to deliver the commodity to its customers.

There were skeptics and pessimists in the first decade of the second half of the nineteenth century, even as there are today in the second quarter of the present century, for the attempt made by Charles C. Little, Isaac Livermore and Gardiner G. Hubbard, to give to the city on the Charles a supply of gas for various purposes was strenuously opposed by many citizens, one of whom dipped his caustic pen into ink and wrote the Cambridge *Chronicle* warning of the danger to trees from gas mains,

and predicting that the Washington Elm would not live long after pipes were laid under it. But the Washington Elm flourished until 1923, and the correspondent has gone to that bourne from which no traveler returns.

The original system installed by the company had five miles of main, as against the present 200 miles or more of pipes.

Almost immediately after the company began manufacturing gas, demands for service came from parts of Somerville, and in April, 1853, an act of the General Court granted it permission to extend its mains into the town of Somerville. Since that time it has supplied that part of Somerville lying south and west of the old Boston & Lowell Railroad.

In 1870 the company moved its plant to Kendall Square. At that time the land now occupied by the extensive works was covered twice a day by the tide, which frequently came up as far as the railroad crossing on Main Street, and the erection of buildings on this site was a big undertaking for those days.

The plant occupies approximately seventeen acres, bordering on the Broad Canal, extending from First through to Third Street and back to Munroe Street, and including a block on the other side of Third Street. Four gas holders on the property have a total capacity of approximately 10,000,000 cubic feet.

The equipment includes a modern coal-handling apparatus with a telpher supporting a monorail upon which electric pick-up buckets carry the fuel wherever desired. This system extends to all parts of the yard and through the sheds and retort house. Elevators and coal crushers are installed at each end of the system. The same facilities exist for handling water-borne coal which is brought up the canal. About one hundred thousand tons of coal are consumed annually.

The company has had eight presidents since 1852, but for more than twenty-seven years it has been under the active management of Albert M. Barnes. He has acted as general manager since 1900, and was first elected president January 2, 1913. The other officers of the company are Karl S. Barnes, vice president, Vinton W. Mason, treasurer, and Isaac T. Haddock, superintendent.

The Cambridge Gas Light Company is the largest tax payer in Cambridge and also pays large taxes in Somerville, and has capital of $1,820,000. It gives employment to 350 people, many of whom have long records of service.

GAS SERVICE IN THE DAYS OF THE "FORTY-NINERS"

The New England Gas and Electric Association, of which the Cambridge Gas Light Company is an important unit, serves a half million population in 130 communities in Massachusetts, New Hampshire, and the Maritime Provinces of Canada.

"Two hundred Chaldron coal @ $5.80." Thus read an early journal entry dated September 18, 1849, in the books of the oldest New England Gas and Electric Association property—the Worcester Gas Light Company. The Association formed in 1926 owns substantially the entire common stocks of the Cambridge Electric Light and the Cambridge Gas Light Companies, the Worcester Gas Light Company, the New Hampshire Gas and Electric Company, and of certain other electric companies serving Cape Cod and Martha's Vineyard in Massachusetts and the Maritime Provinces of Canada.

It has over 69,000 electric customers and nearly 93,000 gas customers in 130 communities in Massachusetts, New Hampshire, Maine, and in the Canadian provinces of New Brunswick, Nova Scotia, and Prince Edward Island, and is affiliated with the Associated Gas and Electric system which has over 1,200,000 customers in 2,200 communities that have 5,300,000 population. The Associated System, with properties in eighteen states, has assets over $800,000,000 and gross earnings at an annual rate of $100,000,000.

$3.50 GAS IN THE GOOD OLD DAYS

Gas was more expensive in the early days than it is now. A Worcester Gas Light Company bill, dated April 1, 1851, shows that the Hon. Stephen Salisbury paid $4.55 for 1,300 cubic feet of gas used during March of that year. Another bill, dated December 1, 1860, indicates that James Green paid $5.25 for one month's service. Colonel John W. Lincoln was the first president of the Worcester company, which had original paid-in capital of $45,000, contributed by thirty stockholders. The Stockholders' Minutes Book, under date of May 9, 1849, has this item:

"Voted that the subscribers now present authorize Messrs. Blake and Darracott to lay the gas pipe as far as the street is to be paved and guarantee the payment for the same in case the works do not go on."

It is interesting to observe in connection with the present value of the Worcester company's plant and equipment that the original building and apparatus for making gas cost $29,727.30. Land at the corner of Lincoln and Belmont streets cost $4,178.89, while an adjoining lot, purchased a few months later, was acquired for $1,800.

The Worcester Gas Light Company has a large modern plant near the rails of the New Haven Railroad, on Quinsigamond Street, and excavation and foundation work on a new plant adjacent to the existing unit was recently started. This addition will double the present gas generating capacity of the corporation, which now serves over 41,000 customers in Worcester, Shrewsbury, Auburn, and West Boylston. During 1928, sixty-seven miles of gas mains were added, and in 1929 mains were laid to Clinton and Sterling.

The Cambridge Gas Light Company's office building is one of the most attractive business buildings in the city, and here are located the headquarters of the New England Gas and Electric Association. Its large and well-maintained plant at Broad Canal, where both coal and water gas is manufactured, serves nearly 49,000 customers.

THE CAMBRIDGE ELECTRIC LIGHT COMPANY

The Cambridge Electric Light Company was organized December 1, 1885, and the first plant was located in a wooden building at 23 Main Street, but on October 11, 1888, the current was turned on at a new station erected on Western Avenue.

In 1887 only six employees were necessary, while today it employs upwards of 225 men and women.

The original unit consisted of a small frame building and the company was financed by a few local prominent citizens, with a capitalization of $60,000. It was a success from the beginning and the makeshift quarters soon gave way to the site occupied by the company's present modern power station.

The year following the opening of the latter, electricity was furnished for storage batteries to run experimental street cars. The batteries proving unsatisfactory, an overhead trolley system was installed on the street car lines running from Bowdoin Square, Boston, to Arlington, a distance of about twelve miles. Before the charter was granted, it was necessary to convince a committee appointed by the State Legislature that 500 volts was not a serious menace to life. Several persons who had accidentally received a shock as well as a few dare-devils who claimed to have tried it just to find out how it felt were produced as witnesses.

The Cambridge company's rates for a long time have been, with perhaps one exception, the lowest of any privately owned company in the State of Massachusetts. To guard against interruptions of current supply through accidents, there are five separate cable connections with the Edison System of Boston. Several automatic switches have been installed in important locations so that immediate connection with another cable can be made if necessary. A large part of the company's lines are underground, including those on practically all the main highways.

THE ASSOCIATION'S ACTIVITIES ON HISTORIC CAPE COD

The *Mayflower,* to which so many Americans trace their ancestry, made her first stop at Provincetown on the extreme tip of Cape Cod. It is claimed, however, that explorers and adventurers set foot on these shores as early as 1000 A. D. Today, the quiet villages with their mammoth shade trees of oak and maple, with miniature lakes and occasional windmills nestling among the hills, present an attraction which more than doubles the population during the summer season. Indeed, an industry called "entertainment of summer guests" has developed into interesting and lucrative employment for many native residents.

With the exception of Provincetown and several other small communities nearby, practically the entire Cape is served with electric current by the Cape & Vineyard Electric Company. The number of communities served on Cape Cod and Martha's Vineyard is approximately seventy, with an estimated population of 100,000 in summer and 30,000 in winter.

It was in 1909 that the first electric current was generated in Dr. Swift's garage in Falmouth, this location being offered when no other satisfactory place could be secured. The first transmission line was stretched on five poles, three of which were placed in front of the post office and the other two nearby. During the first few months of operation, there were only fifteen street lamps for which no payment was received until the town meeting approved the bill in February, 1910. The company had but seventeen subscribers when the plant was established.

Portsmouth, the only seaport in New Hampshire, and the trading center of a population of 40,000 normally, and of more than double that number during the vacation season, had its first electric power supply in 1897. The New Hampshire Gas and Electric Company, with headquarters at Portsmouth, operates in thirty-two cities and towns, serving a population of 40,000. Energy is supplied wholesale to the Exeter & Hampton Electric Company and the Amesbury Electric Light Company, serving Amesbury, Salisbury, Salisbury Beach and Merrimac, Massachusetts.

The companies comprising the New England Gas and Electric Association have had a substantial growth in number of customers and output of electricity and gas as shown below:

Year	Sales K.W.H.	Gas M.C.F.	Customers Electric	Gas
1920	64,677,346	2,252,304	24,756	80,206
1921	54,345,234	2,260,777	28,728	81,341
1922	68,391,743	2,269,884	33,795	82,147
1923	73,569,367	2,421,145	38,450	83,974
1924	77,396,402	2,405,254	43,757	85,205
1925	88,116,827	2,479,422	50,064	87,332
1926	94,955,036	2,644,199	57,945	88,659
1927	95,700,298	2,692,429	63,662	89,995
1928	117,804,530	2,846,190	69,298	92,738

In spite of the fact that gas is no longer generally used for lighting as it was in the days when "a chaldron of coal cost $5.80," these figures show that more customers are making a greater use of this service than ever before.

The officers of the New England Gas and Electric Association are: President, J. I. Mange; vice presidents, H. C. Hopson, John M. Daly and Warren Partridge; vice president and general manager, F. H. Golding; treasurer, H. C. Hopson; secretary and assistant treasurer, DeWitt Clinton.

The officials of the Cambridge Electric Light Company are: president, J. Henry Russell; vice presidents, Gustavus Goepper, Warren Partridge and F. H. Golding; treasurer and clerk, DeWitt Clinton.

The executives of the Cambridge Gas Light Company are: president, A. M. Barnes; vice presidents, Warren Partridge, Walter F. Earle, I. T. Haddock and F. H. Golding; treasurer and clerk, DeWitt Clinton.

The Worcester Gas Light Company has the following officers: president, J. I. Mange; vice presidents, Warren Partridge, F. H. Golding, I. T. Haddock and DeWitt Clinton; treasurer and clerk, DeWitt Clinton.

The Cape & Vineyard Electric Company has these officers: president, J. I. Mange, vice presidents, H. C. Hopson, John M. Daly, Warren Partridge and F. H. Golding; treasurer and clerk, DeWitt Clinton.

The West Boston Gas Company, another unit of the Association, has the following officers: president, T. C. Fales; vice president, F. H. Golding; treasurer, Vincent Goldthwaite; assistant treasurer, DeWitt Clinton; clerk, Nelson C. Fales.

The Dedham & Hyde Park Gas Company is officered as follows: president, T. C. Fales; vice president, F. H. Golding; treasurer, Vincent Goldthwaite; assistant treasurer, DeWitt Clinton; clerk, Nelson C. Fales.

The Middlesex County Electric Company has the following officers: president, J. I. Mange; vice presidents, H. C. Hopson, S. J. Magee, John M. Daly, F. H. Golding and L. H. McCray; treasurer and clerk, DeWitt Clinton.

In 1853 P. J. McElroy & Company began the manufacture of glass tubes, scientific and surgical instruments, which during the next half century were marketed by the concern throughout the United States, South America, Japan and Australia.

In 1854, Tyler and Otis Howe, father and son, formed the Howe Spring Bed Company and began the manufacture of spring beds. Upon the death of the elder Howe, in 1880, the son continued the business until 1891, when Melvin M. Hannum purchased it and occupied three floors of a factory, 80 by 40 feet, marketing the product throughout the United States and in England.

In 1856, Alexander McDonald began the cutting of marble for monu-

mental purposes, and later invented the McDonald stone-cutting machine, which entered all of the large granite works from Maine to California. He was the first to operate a quarry entirely by steam-power, without the use of horses or oxen. In 1887 his son, Frank R. McDonald, became a member of the firm, and the name of the concern was changed to Alexander McDonald & Son.

JOHN REARDON & SONS COMPANY

When John Reardon founded the soap and candle manufacturing business in 1856, now known as John Reardon & Sons Company—a subsidiary of Wilson & Company, Inc., of Chicago, Illinois—the production of candles was a very important New England industry, and it continued to be such until the discovery of mineral oil.

In 1863, Edmund and James H. Reardon, sons of the founder, were admitted to the firm, and from that day to this there has been no change in the name of the company.

It early became a large exporter of tallow to England and the European Continent, and built up an extensive trade in the southern states located east of the Mississippi, as well as in New York, Pennsylvinia and throughout New England.

At one period it was extensively engaged in the manufacture of oleomargarine oil and butter.

The present factory, covering an acre of ground, was erected in 1878, and a glycerine plant was built in the '90s. John Reardon, the founder, died in 1883, and James H. Reardon died four years later. The business was carried on by Edmund Reardon until it was acquired by Wilson & Company, Inc., of Chicago. The concern has capital of $92,300 and employs upwards of 100 operatives.

J. I. Russell is president, Amos Taylor, secretary; Robert F. Caskie, vice president, and P. Cormier, treasurer.

HENDERSON BROTHERS COMPANY

From 1886 until ten or fifteen years ago the most extensive carriage manufacturing business in Cambridge was that carried on by Henderson Brothers, at 2067 Massachusetts Avenue.

John J. and Robert Henderson founded the concern in 1856, and were the pioneers in the establishment of a carriage repository, outside of Boston. In 1892, the factory was completely destroyed by fire, but it was at once rebuilt, the main building being of brick, 250 by 85 feet, five stories high, while in the rear of this structure are three factories, one 212 by 50 feet, and two others, which combined have an equal area.

In the heyday of the horse-drawn vehicle the company attained a nation-wide reputation for its brakes, drags, barges, wagons, mail, depot, hotel and passenger carriages, as well as hacks, landaus, coupes, sleighs, pungs and caravans.

With the advent of the automobile it turned its production to auto truck bodies and employs upwards of thirty-five operatives today. The concern has capital of $100,000. Francis R. Henderson is president and treasurer, and H. E. Harper, secretary.

In 1858 F. Ivers & Son began the manufacture of carriages and by the '90s they were occupying a factory covering an area of 20,700 square feet. The concern specialized in the Ivers buggy and light road wagon, and it shipped its products all over the United States and abroad. It was the

first to apply the bicycle wheel to the racing sulky, and became the New England agents for various western houses producing this type of vehicle.

SOME ENTERPRISES OF THE SIXTIES

In 1860 David Wilcox began the manufacture of stiff, silk and soft hats for the retail trade, the local factory having a capacity of from sixty to seventy dozen per day, with 150 operatives on the payroll. The partnership included David and Elbert P. Wilcox and F. R. Goring.

In 1860, Edward Kendall and John Davis formed the firm of Kendall & Davis, which continued for several years, and upon the withdrawal of the junior member, George B. Roberts, of Cambridge, became associated with the concern which was known as Kendall & Roberts for twenty years thereafter. The output for years was steam plants for many of the largest manufacturing establishments in New England, while the boilers they produced were shipped to customers in all parts of the country. In less than fourteen years upwards of 5,000 boilers were manufactured by the concern, and Messrs. Kendall & Roberts invented a flange-punch and a planing machine for planing the edges of boilers before they were bent.

In 1887 Mr. Roberts retired from the firm, and the business was continued by Mr. Kendall, and his sons, George F. and James H. Kendall. The new partners erected new and larger buildings, installed up-to-date machinery, and occupied about 45,000 square feet of manufacturing space. When operating at capacity they employed 200 operatives. In later years they developed compound and triple expansion engines, built horizontal tubular boilers, as well as those of the upright type, many of which were installed in the copper and iron mines of Lake Superior, in cotton, lumber and sugar mills, in the South and the West, as well as in China, Constantinople and South America.

THE WETHERELL BROTHERS COMPANY

The Wetherell Brothers Company was founded in the '60s, the first warehouse being located on Liberty Square, Boston, the building being destroyed in the great Boston fire. For many years thereafter the concern had its headquarters on Oliver Street, Boston, and removed to Cambridge, in 1920, where it erected its present warehouse and office, at 251 Albany Street. The concern is not merely a steel jobbing house, but it acts as mill representative of many of the leading steel producers of the United States, including the Le Belle Works, and the Morris & Bailey Steel Company, of Pittsburg, the Eastern Rolling Mill Company, of Baltimore, the Fitzsimons Company, of Youngstown, the Monongahela Iron & Steel Company, of Paden City, W. Va., The Athenia Steel Company, of Athenia, N. J., and Kayser Ellison & Company, Ltd., of Sheffield, England.

F. A. Wetherell is president, and L. H. Wetherell, treasurer and vice president, both being sons of the late F. J. Wetherell, one of the founders.

THE WORTHINGTON PUMP & MACHINERY CORPORATION— BLAKE & KNOWLES WORKS

About 1862, George Fordyce Blake, then superintendent of a Medford brick yard, invented the Blake pump, the product being one born of necessity, as it was inspired by the imperative demands of the yard in which the inventor worked, where the clay pits were frequently flooded with water. So successful was the device that Mr. Blake abandoned brick-making, and in 1864, began the manufacture of his pumps, water meters, brick presses and other machines, all of his invention, in a small shop, on Prov-

ince Street, Boston. Five years later he moved to Chardon Street, and in 1872 he occupied the entire building at the corner of Causeway and Friend streets, where he operated under the name of the George F. Blake Manufacturing Company until 1890, when he transferred the machinery to a new plant, in East Cambridge, which included offices, machine and forge shops, brass and iron foundries, pattern and carpenter shops, a power house and storage buildings.

The story of the inventions of Lucius J. Knowles in the chapter devoted to the Crompton & Knowles Loom Works, of Worcester, carries the details of the Knowles pump, evolved by him, the rights to manufacture which he sold in 1879 to the Blake concern.

The two units operated separately for eighteen years thereafter, although controlled by the same financial management. In 1897 the Knowles shop was moved to the Blake works at Cambridge, the building being enlarged for the purpose, and the combination became known as the Blake & Knowles Steam Pump Works.

In 1916, the Blake & Knowles Steam Pump Works, together with seven of the largest pumping machinery manufactories in the United States, which had for some years been affiliated and were collectively known as the International Steam Pump Company, were reorganized as the Worthington Pump and Machinery Corporation, the Cambridge plant being known as the Blake & Knowles Works.

The output comprised a vast amount and variety of pumping and allied machinery, covering the requirements of almost every industrial activity and extending over a world-wide area. Pumps for sugar-house work, including an astonishingly long list of special purpose pumps; pumps for marine service, covering the navy and merchant marine (more than 90 per cent of all the United States naval vessels built have been fitted out with complete equipments of Blake & Knowles pumps, and the requirements of a single ship call for from twenty-five to fifty pumps of various types); waterworks pumps; pumps for tanneries, soap works, cotton, woolen, paper and silk mills, quarries, foundries, chemical works, mine pumps; deep well and artesian well pumps, elevator pumps, sewage pumps, hydraulic pumps, wrecking pumps, boiler feed pumps, vacuum pumps, underwriter fire pumps, fuel oil pumping systems, feed water heaters, evaporators, distillers, condensing machinery, air compressors, power-house auxiliaries, core wire straighteners and cutters; steam engines, heavy oil engines; steam-air ejectors, etc., were among the devices produced at the Cambridge plant, until 1927, when the equipment was removed to the Deane Works, of the Worthington concern, in Holyoke, where pump operations are carried on today.

With the coming of the World War most of the commercial lines of product were discontinued temporarily and the whole area and energy of the plant were given over to the needs of the Government in building pumps for the hundreds of destroyers, submarine chasers, mine sweepers, ships for the Shipping Board Emergency Corporation, etc., that were being rushed to completion. The capacity of the plant was practically doubled, new buildings were erected, new equipment was installed and the productive force increased—all in an incredibly short time. All demands for war requirements were successfully met, despite great difficulties, within contract time.

One of the most notable additions to the lines of Blake & Knowles products in recent years was the Worthington two-cycle, solid-injection Diesel engine, which was designed and perfected by George R. Aborn,

the manager of the Cambridge plant. It is an engine of marked improvement over existing types, and stands as the latest word in internal combustion prime movers.

The Worthington Locomotive feed water heater and pump, a locomotive auxiliary that makes possible a saving of from ten to twenty per cent in coal required for operation, which was in the process of development for several years, has now become a prominent item of manufacture with a future of immense possibilities.

THE STANDARD TURNING WORKS

In 1862 the Standard Turning Works were established, and were incorporated twenty years later. Installing automatic and special machinery the concern made a specialty of turnings of any description in wood and ivory.

The corporation has capital of $25,000, and employs fifteen operatives. William R. Reid is manager.

F. Geldowsky began the manufacture of fine furniture in a small way, on Utica Street, Boston, in 1862, and removed to Cambridge two years later. Soon his name became known throughout this country and Canada, and for twenty years he ranked without dispute as the leading producer of furniture in America. In 1877 he met with financial reverses, and C. P. Keeler & Son assumed control of the business, retaining Mr. Geldowsky as manager. They then occupied an immense plant bounded by First, Second, Otis and Thorndike streets, and in 1884 opened their Washington Street, Boston, retail store. Mr. Geldowsky remained with the concern until his death in 1890.

Alvin F. Sortwell and Ruel P. Buzzell were the partners in the Keeler concern.

THE REVERSIBLE COLLAR COMPANY

In the early sixties the manufacture of paper collars was an important American industry, and in 1862 George K. Snow invented improved machinery and processes of their production, effected an arrangement with March Brothers, Pierce & Company, of Boston, to market the goods, and began their manufacture.

Following the Civil War when the demand for the paper collar and cuff began to fall off, Mr. Snow turned his inventive faculties to producing another type of haberdashery, and The Reversible Collar Company was incorporated in 1866, with Mr. Snow as its president, George N. March, as its treasurer, and the manufacturing processes were transferred from Boston to Cambridge, a building being purchased located between Arrow and Mount Auburn streets. It was at that period that Mr. Snow invented and patented a machine for uniting cloth and paper in continuous rolls, which superseded the hand process previously in vogue. It enabled the company to produce the most perfect fabric for machine-made collars that had been discovered, and the method is now used in the manufacture of the commodity from which linene fabrics are made.

In 1883, Mr. March retired as treasurer, and was succeeded by Eben Denton, who introduced a new line of production, that of manufacturing colored, glazed, and enameled papers, the demand for which grew apace.

Upon the death of Mr. Snow, in 1885, Phineas Pierce became president, and the growth of the business demanded additions which occupied all of the land that had been purchased.

In 1893 a new location was secured, extending from Putnam Avenue

to Banks Street, and two years later a main factory, 222 by 76 feet, three stories high, with basement, and an engine room 57 by 60, two stories high, were erected.

That year the company manufactured 11,573,000 linene collars and cuffs, and sold 1,440 tons of its papers.

The Reversible Collar Company conducts the operations of the Middlesex Products Company, which was established in 1893 by George K. Snow, George N. March, Phineas Pierce, and S. S. Gray, and which is engaged in the manufacture of glazed, plated, embossed and cloth lined papers, the glazed and embossed types being used mainly for the covering of boxes, while the plated or dull finished papers are employed in preparing labels and for printing in general.

The cloth lined paper is used for maps, wall charts, large envelopes, pamphlet covers, clothing tickets, tags, and a variety of purposes where something stronger than ordinary paper is required.

Elwell R. Butterworth, son of the late Robert Butterworth who was with the parent company for over fifty years, is superintendent. George H. Riker is assistant superintendent of the plant.

The parent company, in addition to conducting the business of the Middlesex Products Company manufactures Linene collars and kindred products. Walter B. Snow is president, and William G. Snow, treasurer, both being sons of the late George K. Snow, one of the founders.

The main office is at 38 Chauncy Street, Boston, and the plant, located at 111 Putnam Avenue, Cambridge, contains about 100,000 square feet of floor space.

THE J. L. HAMMETT COMPANY

In 1863, J. L. Hammett established, in Boston, the first school supply house formed in the United States, and for sixty-seven years it has been providing school supplies.

In 1895 the concern was incorporated as the J. L. Hammett Company. Increasing business necessitated several changes to larger quarters, and in 1915 the company purchased a common lot on Main and Hayward streets, in Cambridge, and erected a four story brick plant, one hundred feet square.

Another plant and warehouse are operated in Newark, N. J., this building being four stories high, 105 feet square.

A retail store for the convenience of teachers and those interested in educational material is maintained at 10 Beacon Street, Boston, and since 1898 a branch store has been operated in New York City. This unit now occupies an entire floor in the Bush Terminal Building.

The company's catalogue contains over three thousand items, and includes everything for schools from installing blackboards and school furniture to filling contracts for paper, pencils, composition books, and all other items used in the various grades from the kindergarten to college.

If the reader's school days do not run back more than sixty years and especially if he attended educational institutions anywhere in New England during that period he sat at a Hammett desk; he learned to bound the Mediterranean Sea from a Hammett map; undoubtedly he wrote an essay on Abraham Lincoln, in a Hammett composition book; presumably he chalked "Tommy Lowe Loves Mary Lane," on a Hammett blackboard, with a Hammett crayon, when the teacher's attention was distracted, and he rubbed it out with a Hammett eraser before she caught him red-handed.

The corporation has capital of $400,000 and employs 150 operatives. D. R. Knight is president, Robert Brown, secretary, and H. H. Young, treasurer, of this corporation.

The Bay State Brick Company was organized in 1863, with capital of $75,000, which later was increased to $300,000. Thirty years later the concern was employing from 300 to 400 men, and making 50,000,000 to 60,000,000 bricks annually.

THE BROADWAY IRON FOUNDRY COMPANY

In 1864, Henry M. Bird, a native of Easton, where he was born October 24, 1824, and who had been an employee of the Chelmsford Iron Foundry, at North Chelmsford, and of the Navy Yard, at Charlestown, where he was foreman, established the Broadway Iron Foundry, which he operated until his death in 1890. Five years later the concern was incorporated, one son, William W. Bird becoming president and another, Robert C. Bird, being elected treasurer.

In 1913 a brass foundry was added and five years later the concern acquired by purchase the business of Miller & Shaw, of Cambridge, a concern that had been in business for more than twenty years, and which manufactured portable steam hoisting engines, hydraulic presses and general machinery. The Broadway Iron Foundry also took over at that time the assets and equipment of the Belcher Engineering Company of Cambridge, and of the Carroll Machine Company of Malden, and the three units were consolidated into the machine department of the Broadway Iron Foundry Company, the capital stock of the latter concern being increased to $75,000. The company specialized in castings for bridge work; gears, pinions and sprockets for ice housing; waterpipe fittings such as sleeves, elbows and tees, and power transmission collars, couplings, boxes, truck wheels and sheaves; manhole covers and frames, used for sewers and electric-light installations, boiler parts and grate bars in all diameters and lengths.

The repairing of automobile fly-wheels was also a specialty, the company's process of riveting a new ring gear on an old fly-wheel making a great saving, as it provided a new fly-wheel at but a fraction of the cost of a complete new one.

At the time the Broadway Iron Foundry Company was absorbed by Barbour, Stockwell & Co., in 1928, it was employing seventy-five to one hundred operatives. The unit is now operated by the latter concern.

In 1866 Daniel E. Frazier and Alpheus K. Smith formed a partnership and began the manufacture of piano hammer covers. Mr. Smith retired from the firm in 1885, and the business was conducted by Mr. Frazier.

THE PENN METAL COMPANY

In 1869 the first unit of the Penn Metal Company was established, in Ironton, Ohio, and a few years later the executive offices of the concern were removed to Philadelphia, where they remained until 1910, in which year they were transferred to Cambridge, and here they have been continued for twenty years.

While the corporation operates three plants, the one on Concord Avenue, Cambridge, is by far the largest and most extensive, occupying approximately two acres of space. The Philadelphia unit contains an acre and a half of area, and the branch, at Parkersburg, West Virginia, has an extent of an acre.

From its inception the concern has specialized in fireproof building

materials, fashioned of sheet steel, and the vast majority of its products were invented by the company's engineers and developed by the corporation until today they are accepted in this and other countries as standard commodities. They include expanded metal lath and accessories, channel iron, steel pipe, metal ceilings, pressed steel, corner bead, steel door frames and partitions, roofing and culvert pipe.

While the principal offices are located in Cambridge, salesrooms and warehouses are operated in New York City, Chicago, and Portland, Me. George A. Sagendorph is president, J. P. Dolan, secretary, and Lloyd A. Sagendorph, treasurer.

The corporation has capital of $1,200,000 and employs upwards of 300 operatives. Within recent years it has developed an export department, and today its products enter markets in many foreign lands. George M. Sullivan is manager of this Cambridge unit.

THE WARREN SOAP MANUFACTURING COMPANY

The Warren Soap Manufacturing Company was established in 1870, and was incorporated twenty years later, with capital of $150,000. For sixty years it has been engaged in the manufacture of industrial soaps, and has specialized in products required by textile concerns. The Boston office is at 77 Summer Street. A. H. Bixby is president, Ralph L. Warren, treasurer, and M. A. Wheeler, secretary of the corporation.

GINN & COMPANY

More than three score years have passed since Edwin Ginn published his first book, Craik's "English of Shakespeare," but the Athenaeum Press, which he founded, is today one of America's great publishing houses. Soon after the concern started, the partnership of Ginn Brothers was formed, and for forty-five years the business has been carried on under the name of Ginn and Company, and always in the partnership form, there being today nearly a score of associates.

During the earlier years, a small manufacturing plant was operated in Boston, but larger quarters were required and a favorable site for a press was chosen on the Cambridge side of the Charles River, not far from Harvard University and the present site of the Massachusetts Institute of Technology.

In 1886, Hon. Lewis Parkhurst entered the employ of Ginn & Company and three years later was admitted as a partner, and became general manager.

In the fire proof building erected in 1897, there are approximately 300,000 square feet or nearly seven acres, of floor space, the largest factory in the world devoted entirely to the composition, printing, binding and shipping of school books. Shortage of power is never faced, for in addition to a connection with a local power company, the Athenaeum Press maintains its own plant, which can provide all the power, heat, and light required.

The press rooms occupy two floors, each 400 by 70 feet, and contain upwards of sixty presses, most of which are fed automatically, as well as being controlled automatically. One large room, containing a battery of ten presses is devoted exclusively to color printing, eight being devoted to two-color work.

Approximately 850 men and women are employed, about fifty of whom have been with Ginn and Company between thirty and forty years, and about one hundred and seventy-five for twenty years or more.

The company maintains its editorial department at 15 Ashburton Place, Boston, and branch offices are operated in New York, Chicago, Atlanta, Dallas, Columbus, San Francisco and London.

The printer's mark of the Athenaeum Press is known the world over. It shows a strong hand holding a hornbook, the earliest form of primer. On the face of the hornbook are either the first fourteen letters of the alphabet, signifying learning, or the words "Ginn and Company." This emblem is framed by oak leaves, for strength; and by laurel, for success. Beneath this famous mark are the words "The Athenaeum Press."



GINN & COMPANY'S ATHENAEUM PRESS, CAMBRIDGE, 1928

The present partners in the enterprise are G. A. Plimpton, Lewis Parkhurst, Henry H. Hilton, C. H. Thurber, T. B. Lawler, Selden C. Smith, O. J. Laylander, F. C. Hodgdon, E. A. De Witt, L. B. Robeson, Mark R. Jouett, J. W. Swartz, Le Roy J. Weed, H. P. Conway, Norman C. Miller, E. H. Kenerson, A. L. Priddy, Millard H. Jencks, and Ernest N. Stevens.

THE BOSTON WOVEN HOSE & RUBBER COMPANY

The story of the Boston Woven Hose & Rubber Company illustrates the hazards attending the development of a machine-made product.

Lyman R. Blake, renowned as the inventor of the sole-cutting machine made famous by Gordon McKay, whose name persists to this day in the footwear field where the McKay process is used in contradistinction to the Goodyear welt, early turned his genius to the production of a machine for sewing strips of rubber-coated canvas into hydraulic hose.

Whether it was the success attending Blake's sole-cutting device that led Col. Theodore A. Dodge to believe that anything flowing from Blake's master-mind spelled dollars to the owner, or whether he was simply the victim of public disfavor in attempting to market the product turned

out by the machine, the fact remain that the Blake invention proved a total loss to Colonel Dodge. While the hose produced was excellent in quality, it failed to find a ready market due to the fact that it carried a stitched seam. The singular thing in connection with the hose is that tests proved that this stitched seam was in reality the one part of the hose that never gave out, but nevertheless a finicky public would have none of it, and Colonel Dodge was forced to look elsewhere for a device, the product of which could be readily sold.

In 1872, James E. Gillespie placed before Colonel Dodge a loom for weaving multiple tubular fabrics. Previous to that time no tubular goods had been woven except on flat looms, and this method resulted in a weak spot along the edge. Fabrics woven in the round could not be manufactured with sufficient solidity to guarantee them, and only braided fabrics had ever been successfully marketed. Colonel Dodge was impressed with the possibilities of the Gillespie loom, but he at once saw it was so complicated in design, with its eighty thousand parts, that it could not be made practical. Securing Robert Cowan, a young machinist, to coöperate with Gillespie, on a new and less complicated model, the two set at work upon the problem. Gillespie soon withdrew, and before the ability and persistence of young Cowan triumphed, Colonel Dodge had sunk $150,000 in the device.

In 1873, he successfully tested the first length ever manufactured of rubber-lined, multiple-woven cotton fire hose, before the fire commissioners of Boston. It had been woven in the Gillespie-Cowan loom, and while the authorities could find no flaws in the product, they were loath to recommend it because it was an innovation.

With Cowan, a man and a boy, Colonel Dodge began the manufacture of rubber hose, in part of the Curtis Davis soap factory, on Portland Street, Cambridge, in 1880, and about 15,000 feet of cotton garden hose were marketed that year. Success attended the enterprise from that hour and in 1884 J. Edwin Davis became treasurer and manager of the Boston Woven Hose & Rubber Company, which was formed that year, with capital of $150,000. Soon sixty hands were employed in the building on Broadway, opposite the present factory, to which location the business had been removed. By 1886 the enterprise had grown to such a size, that the 18,000 square feet in this plant were insufficient for the demands, and the Kinsley Iron Company property was purchased, and a substantial brick building erected, while a number of adjoining structures were reconstructed. By 1888 it was found necessary to increase the capital from $225,000 to $350,000, and the company was incorporated that year. Four years later adjoining land was bought, and additional factory buildings erected, and in 1893 the capital was increased to $600,000. It had begun operations with 3,660 square feet in 1880, and on January 1, 1896, it was occupying 247,530 square feet. The energy of Mr. Cowan, who became vice president of the concern, and who was the designer, inventor, and builder of almost countless machines, and devices, knew no bounds.

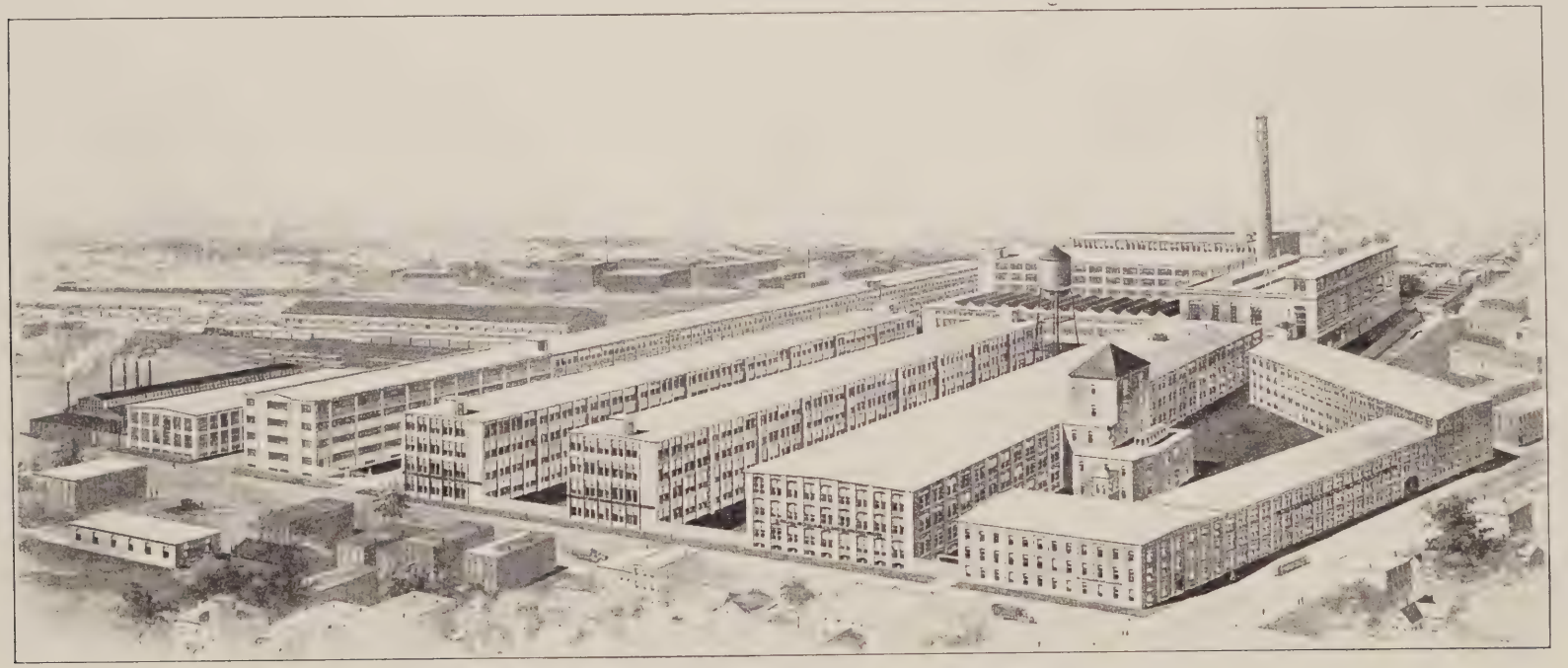
The lines of production were broadened to include almost everything then possible to manufacture from rubber.

The company had fully established its credit with consumers when along came the bicycle era, and many readers of this history will recall, with a thrill of pleasure, the happy hours they spent while pedaling along the highways, superimposed upon a "Vim" bicycle tire—one of the company's outstanding products of the nineties. The "Vici" brand, introduced



1878

ORIGINAL PLANT OF THE BOSTON WOVEN HOSE & RUBBER COMPANY, CAMBRIDGE



BOSTON WOVEN HOSE & RUBBER COMPANY, CAMBRIDGE

by the company, was provided with an inner tube. The demand for these commodities was such as to require the operation of the company's plant twenty-four hours a day, and to necessitate new buildings and equipment, and $300,000 additional new capital, all of which were provided, and then came the practical collapse of the bicycle industry in 1899, following quickly on the heels of the financial panic of four years before. The market for bicycle tires withered almost overnight. The company faced a crisis. Here was a plant that had been greatly enlarged to meet a situation that seemed to possess permanency. What was to be done to take up the slack? Were the officials of the corporation to throw up their hands, liquidate the concern and retire from the field?

That was not the temper of the Massachusetts men who had founded and fostered this enterprise.

They reorganized the concern, turned their attention to the manufacture of the products from which it had previously derived its healthy growth, and in the early years of the twentieth century brought it back to its former prosperous condition.

New processes of manufacture, and new machines designed for the exclusive use of the company, greatly assisted in bringing the return of the mechanical rubber business which had been neglected.

From that time to the present its history has been a story of sound, steady growth and of economical production. Few companies number among their workmen so many who can point to years of faithful, contented service. There are men who worked at the bench with the founders and it is to such men and to a management which can retain such men that the company owes no small share of its success.

Today, the plant consists of nineteen separate buildings, covering fifteen acres, occupying the entire block bounded by Hampshire, Portland and Binney streets, in Cambridge, and includes a half-million dollar power house, and its own brass foundry, where hose couplings and nozzles are turned out. An auxiliary plant at Plymouth, where old automobile tires are reclaimed, together with the Cambridge factory, give employment to almost 2,000 persons. More than twenty types of rubber hose are manufactured, including the fire, suction, pneumatic, air, chemical, creamery, garage, gasoline, spray, and steam-drill varieties, and the famous "Bull Dog" garden hose, perhaps the oldest and best-known in the world, of which variety the concern has frequently shipped in a single day a quantity that would reach from Boston to Framingham if laid lengthwise.

Among other important products of the concern are rubber heels and soles, rubber mats and matting, rubber belting, gaskets, friction tape and rubber tape, and the internationally famous "Good Luck" fruit jar ring, used and endorsed by canning club experts and demonstrators teaching the Cold-pack method of preserving recommended by the United States Department of Agriculture and by the leading domestic science schools. The "Good Luck" product was the first to be found successful in this method of canning which requires the ring to be cooked on the jar with the fruit or vegetables.

Other products include rubber packing, tubings, motor fabrics, aprons, blankets, brass fittings and nozzles. J. Newton Smith is president and treasurer, W. L. Larkin, clerk, and J. William Fellows, assistant to the president, and upwards of 1,200 operatives are employed. The corporation has capital of $5,000,000.

In 1928 the company produced approximately nine per cent of all

the mechanical rubber goods manufactured in the United States, and about 80% of its output goes to distributors and large consumers, 14% into the export field, and six per cent to small customers.

In the six months of the company's fiscal year ending March 1, 1928, the net sales amounted to $4,401,460, an increase of four per cent over the dollar volume of the same period of 1927, and this in the face of price reductions inaugurated by the corporation, and indicating an increase in poundage of shipments well over the 43,229,580 pounds produced in the 1927-28 fiscal year.

The corporation is constantly experimenting with new products and in 1928 introduced a new type of conveyor belt, with a renewable rubber surface, which gives promise of increasing the conveyor belt output of the concern.

In 1929 the company acquired three factory buildings, each three-stories high, containing 63,000 feet of manufacturing space, and 76,741 feet of land, bounded by Broadway and Hampshire streets, the Boston & Albany Railroad Company's tracks, and the Broad Canal, in Cambridge, and while it does not expect to immediately extend its manufacturing operations to these structures it is looking to future requirements. These structures were formerly occupied by the Page Box Company.

THE ASHTON VALVE COMPANY

Henry G. Ashton, a native of England, founded the Ashton Valve Company, in 1871, and incorporated the concern six years later, the first factory and office being located on Federal Street, where two to three men were employed. Following the Boston fire the concern moved to Franklin and Batterymarch streets. In 1908 the present factory, which fills the entire block between Rogers and Binney streets, on First Street, in Cambridge, was built, and nine years later the concern was incorporated.

The railroads soon discovered the merits of Ashton steam gages, air gages, safety valves and other appliances especially designed to meet railroad requirements, and later a variety of kindred locomotive and power-plant specialties, was evolved. The gage line is extensive, including types for air, water, steam, steam heat, oxy-acetylene gas pressure, altitude, ammonia, and caisson work.

Ashton products meet the conditions of the close regulation required by the rules of the Federal Boiler Inspectors, and of all the various government and railroad associations and bureaus. Its patents cover broadly the most valuable and desirable improvements, and additions have been made from time to time, as study and experiment prove advisable. The company keeps fully informed regarding the inventions of others, and does not hesitate to strengthen its position by acquiring such other patents as it deems meritorious.

One American railroad alone has 2,963 Ashton safety valves in service, some of which are from twenty-five to thirty years old.

Ellery Peabody is president, Joseph W. Motherwell, vice president and general manager, Adrian D. Perry, secretary and assistant general manager, and Fred H. Ashton, assistant treasurer.

The corporation has capital of $250,000 and employs more than 200 operatives. It maintains branch offices in New York, Chicago, and San Francisco, and has established connections with approximately forty agencies in the United States and foreign countries.

THE REVERE SUGAR REFINERY'S COOPERAGE PLANT

The Revere Sugar Refinery began operations in Cambridge, in 1871, but today only the cooperage unit is located in the city. All the refining is done at the company's modern refinery, in Boston, and the Revere unit is a subsidiary of the United Fruit Company, of Boston.

The cooperage plant is the successor to the enterprise established by William and Gustavus Goepper, in 1871, who began the manufacture of barrels, in Charlestown, that year, removing to Cambridge in 1872. In 1880 the firm bought a frontage of 210 feet along the line of the Grand Junction Railroad, and erected a plant at 71 Ninth Street, which gave employment to thirty men, and which had a capacity of 5,000 barrels a day.

THE AMERICAN RUBBER COMPANY

For a century following 1736, when rubber was first made known to Europe, it was one of the seven wonders of the Western World, but nature challenged man to subdue it. While a Scotchman named MacIntosh took out an English patent, in 1823, and made waterproofed coats, and others followed with rubber shoes, the mackintoshes and footwear stiffened on cold days, and stuck to anything handy on warm days. It was not until January, 1839, that Charles Goodyear, a Yankee hardware merchant, accepted the challenge, by dropping some rubber and sulphur together on top of a red-hot kitchen stove, and learned the "how"—but not the "why" —of vulcanization.

Within a century thereafter the American rubber industry had become a billion dollar proposition, and, in a sense, it is our most essential industry. For rubber has had its part to play in the origin and evoluton of virtually every mechanical invention we possess. Without rubber packing steam engines could not operate. Without rubber insulation we could not use electricity. And, to go no further, without steam and electrical power we could not have many of our common creature comforts, and could not enjoy a standard of living that is the highest the world has ever known.

In 1800, the year of the birth of Charles Goodyear, the first shipment of crude rubber was received in the United States and exactly twenty years later the first pair of rubber shoes arrived in Boston, from China.

In 1823 a shipment of five hundred pairs of rubber shoes from Brazil was received, in Boston, and the products were readily sold at from $3. to $5. per pair.

In 1830 E. M. Chaffee devised a method of dissolving rubber and of spreading it on a fabric, and three years later the Roxbury India Rubber Company, was organized, in Boston, to manufacture rubber goods under Chaffee's methods. But the experiment proved unsuccessful, as up to that time all rubber goods made were of little value because of the serious effect of heat and cold upon the commodities, and in 1836 the Roxbury and other companies that had been formed about the same time, failed, with a loss to the investors of $2,000,000.

The American Rubber Company was organized and incorporated in 1872, by R. D. Evans, succeeding Clapp, Evans & Co., which had been preceded by W. W. Burr & Co., and carried on a jobbing business until 1887, when a factory was built, in Cambridge, to manufacture boots, shoes, clothing and wringer rolls. Four years later it was destroyed by fire, and

immediately rebuilt on a larger scale, the capital being increased at that time from $200,000 to $500,000, and later to $1,000,000.

The original factory had floor space of two acres, and 100 operatives were employed, but by 1896 the manufacturing area had been increased to seven and a quarter acres, and the employees numbered 1,500, with the value of products fixed at $3,500,000 per annum. At that time it had a capacity of 25,000 pairs of boots and shoes, and 2,000 rubber coats and mackintoshes per day, the company being among the first to produce the latter in the United States. In 1896 it used 1,200,000 pounds of crude rubber.

The American Rubber Company became one of the units of the United States Rubber Company when that corporation was formed, and it is now a part of that enterprise. It operates another plant under the name of the Stoughton Rubber Company in Stoughton.

In 1892 the United States Rubber Company was incorporated, and acquired control of ten rubber manufacturing companies at the outset, many other units being purchased later. A year before the first clincher tire was made by one of the subsidiary companies of the present United States Rubber Company and in 1895 the first company in the world to manufacture automobile tires was acquired. In 1910, the United States Rubber Company made the first pneumatic truck tires but not until 1925 were the first pneumatic cord bus tires produced, when the same corporation undertook this type of manufacture.

Since 1910 the company has owned and operated the largest rubber plantation in the world.

SOME CONCERNS FORMED IN THE SEVENTIES

In 1873, Waugh Brothers began the manufacture of carriages and in 1884 the name of the firm was changed to Charles Waugh & Co. A large business was done in building sleighs, police patrol wagons, drags, freight wagons, and heavy caravans.

In 1874, C. E. Parry began the manufacture of bricks at the plant formerly operated by the old New England Brick Company and upon his death four years later, his sons, John E. and William A. Parry, formed the firm of Parry Brothers, and in 1880 A. R. Smith became a partner, selling his interest three years later. In 1884 John E., William A., George A., and Richard H. Parry, formed a new firm, known as Parry Brothers, and purchased the assets and plant of the Cambridge Brick Company and transferred the operations of that unit to the extensive new yards they had erected, on Concord Avenue. Their first notable effort was the production of bricks in the winter season—something that had not been successfully accomplished previously in New England.

Later the concern established a large plant in Belmont, which they operated in conjunction with the Cambridge unit.

In 1875 Charles E. Pierce and Charles Waugh formed the firm of Charles E. Pierce & Co., and began the manufacture of cracker, varnish and syrup cans, by machinery. The partners patented a process of making solderless square tin boxes for the use of biscuit and confectionery manufacturers, and they were also patentees of a key-opening screw cantop, which was used in producing cans for preserving.

In 1876, the firm of D. M. Hazen & Co., was established to manufacture chocolates, bonbons and caramels, and six years later it purchased 5,600 feet of land, and a two story building, at 42 Elm Street to which an ell was added. In 1885 the building was further enlarged, and five years

later additional land was bought, and the plant was increased to 80 by 44 feet in size, three stories high, where one hundred hands were employed.

THE SUFFOLK ENGRAVING AND ELECTROTYPING COMPANY

The story of the Suffolk Engraving & Electrotyping Company runs back to the Centennial year of 1876, the concern representing an amalgamation of various firms which in the early nineties were merged into the Suffolk organization, the present treasurer, Samuel E. Blanchard, being one of the principals in bringing the new company into corporate being. When the John Andrews & Sons Company was acquired, Walter H. Bowker, of the former corporation, became president of the Suffolk unit, and in 1921 the six story fire-proof building of reinforced concrete, with drawn steel finish and fully sprinklered, which it built and now occupies, enabled it to house itself in the finest equipped engraving plant in New England.

The valuable original drawings, paintings, maps, charts, and designs that are entrusted to its care by customers are kept in a fire-proof vault, and a flood of north light gives its photographers, etchers, finishers, and artists ideal conditions under which to perform their delicate precision tasks. In the camera room, the most modern electrical photographing apparatus is carried, while in its commercial gallery, where pictures are taken by daylight, the equipment includes a freight elevator, large enough to carry an automobile, permits the delivery of machinery or heavy or bulky subjects that are to be photographed.

The corporation has capital of $275,800 and employs 130 hands. Offices are maintained in Boston and Providence, W. H. Bowker is president, E. W. Downs, secretary, and S. E. Blanchard, treasurer.

THE BOSTON BRIDGE WORKS, INC.

The pioneer bridge building concern of New England was organized in the Centennial year of 1876, by David H. Andrews, who conducted it under the name of The Boston Bridge Works for exactly twenty-five years, or until its incorporation as The Boston Bridge Works, Inc., in 1901.

It has maintained its position for fifty-four years as the largest bridge-building enterprise in this section of the United States, and during that period has designed and constructed more than three thousand bridges, constituting upwards of fifty per cent of the railroad and highway structures of New England.

While it has specialized in steel bridges, it also fabricates and erects structural steel for buildings of all descriptions, and in this line designed and erected, in 1894, the steel structural work for the Worthington Building, on State Street, the first structure of that type ever erected in the city of Boston. The next year all of the steel structural work that entered into the Tremont Building, at the corner of Tremont and Beacon streets, Boston, was designed and erected by The Boston Bridge Works, Inc. The plant, which since its inception has been located at Binney and Sixth streets, Cambridge, covers four and one-half acres.

The ownership of the enterprise remains in the family of the founder, John G. Andrews, his son having carried on the business since the death of David H. Andrews, in 1921.

The officers are John G. Andrews president, William P. Shine, vice president, Henry B. Morgan, treasurer, and Ernest T. Peverly, secretary.

THE IVERS & POND PIANO COMPANY

In the Centennial year of 1876, W. H. Ivers began the manufacture of pianos, in Dedham, and four years later the Ivers & Pond Piano Company was formed, which has continued its corporate existence for fifty years. In 1881, the business was moved to Albany Street, Cambridgeport, and that same year a part of the present factory was built, the building being originally 100 by 50 feet, five stories high. Two years later another section was added 100 by 50 feet, six stories in height, and in 1886 another extension 70 by 60 feet was built, while the original factory was raised another story.

The initial output was six to ten pianos a week and about twenty men were employed. Today, the plant has a capacity of more than 3,000 pianos per annum and 175 men are employed.

The Boston warerooms are at 258 Boylston Street. Clarence H. Pond is president, Thurston P. Day, clerk, and Shepard Pond, treasurer.

W. C. THAIRLWALL & COMPANY, INC.

In 1877 the late William C. Thairlwall, a native of England, began business on Hanover Street, Boston, removing to 45 High Street, seven years later, importing Bradford textiles into this country.

It was not until 1898 that he commenced to manufacture sport silk and thrown yarns, his first factory being located on Binford Street, South Boston, where it remained until 1905, when it was transferred to State Street, Cambridge.

Five years later, the present location at 15 Tudor Street, was purchased and a factory erected.

From ten or a dozen employees at the outset, the concern has grown until today it employs a hundred operatives.

In 1925 the business was incorporated as W. C. Thairlwall & Co., Inc., with capital of $200,000.

The company has specialized from the beginning on high quality threads for stitching and embroidery, and on knitting and weaving yarns of all descriptions.

The founder not only became a notable figure in the silk business of Massachusetts, but he had an interesting career.

Upon the death of his father he began his education in a French military school near Paris. Later he went to Germany, where he was graduated as a civil engineer.

His first engineering experience was in Egypt, in charge of the irrigation of a government cotton plantation on the Nile where he remained three years; from there he went to Paris, where he stayed until the Franco-Prussian War. Escaping from Paris the night before the Prussian army surrounded the city, he returned to England to await peace. But with the advent of the Commune, he concluded that Paris was no place for a foreigner and he proceeded to Russia as superintendent of a cotton mill located about one hundred miles from Moscow.

English mining interests next commanded his services and he made his first appearance in the United States, going to Arizona as the representative of British capital invested there. Boston especially appealed to him and he decided to make his home here.

F. A. Carlton is treasurer and secretary of W. C. Thairlwall & Co., Inc., which employs eighty operatives.

STEWART BROTHERS COMPANY

In 1878 Hugh Stewart began the manufacture of carriages, in Boston, and when an increase in business compelled him to seek larger quarters, he removed to Cambridgeport, and in 1891 erected a factory on Main Street, admitting to partnership that year, his former bookkeeper, J. F. Cutter and forming the firm of Hugh Stewart & Company.

Today, the concern is known as Stewart Brothers Company and employs twenty operatives in the manufacture of automobile tops and curtains.

John M. Mannix is president and treasurer and William J. Mannix, secretary.

THE GEORGE CLOSE COMPANY

Unique among Cambridge manufacturers is The George Close Company at whose plant today are to be observed still in harness, a candy maker hired by the founder, George Close, the first day he operated his factory, in Cambridgeport, in 1870, an office employee who came to work for him the second day and who has been with the concern ever since, and another candy-maker, who started work there a few weeks later.

Many present-day employees have served long terms at the plant and afford evidence that they have found satisfaction in the civil and industrial life of the University City.

These workers have observed an industrial evolution in the plant where they have labored so long. In the early days, all the work was carried on by hand, while today all the main operations are executed by machines. Fifty pounds was a large batch of candy to work in the seventies, while today 300 to 600 pound batches are easily handled.

They have also witnessed a complete change in the methods of distribution. Time was when all the products left the factory through the "wagon men," who were wholesale distributors, and who provided their own horses and wagons. They came to the door of the plant to buy candy which they sold to the storekeepers, and while this trade continues today the product is loaded into motor trucks, and it constitutes a very small percentage of the sales, most of the output being shipped directly by the company to all parts of the United States, as well as to foreign lands.

The George Close Company is unique in another particular in that it is still carrying on in its original factory at the corner of Broadway and Windsor Street, which was erected in 1879. This pioneer concern is the one survivor of the early confectionery manufactories of the city.

The corporation has capital of $175,000 and employs 200 operatives. Frank D. Close is president, and George H. Bunton, is treasurer, secretary and general manager.

PETER GRAY & SONS, INC.

Peter Gray, a native of Edinburgh, Scotland, at the age of fourteen, began an apprenticeship of seven years as a sheet metal worker and subsequently followed his trade in Scotland and England, later coming to New Brunswick, and, in 1866, to Boston, where he was engaged by George H. Mason, as manager of his sheet metal works.

In 1878, he began business in his own name, in Boston, producing lanterns and general sheet metal supplies, and with a force of six men.

At the dawn of the present century, two sons, George M. and Mason H. Gray, who had been in the employ of their father, became members of

the firm of Peter Gray & Sons, and in 1903 the concern moved to a new location in Boston, and following the death of the father, in 1906, two other sons, James T. and Peter, became members of the firm, which was incorporated in 1907, the same year that the present Cambridge factory was built.

Fifty-two years without any form of labor trouble constitutes a testimonial to workmen and management alike.

The interests of the Messrs. Gray in their employees has never ended at the factory gate. They were among the first to adopt a shop committee, they have a monthly bonus system in operation, and the life of every employee of over three months' service is insured at the expense of the company. Peter Gray & Sons are best known as manufacturers of railroad lanterns, train marker lanterns for the rear of passenger trains, engine classification lanterns for locomotive use, locomotive cab lamps, elevated train markers, drawbridge and pier lanterns being among their standard designs. The company also produces a variety of lanterns for other purposes and for many years it has manufactured the huge storm warning lanterns required by the United States Weather Bureau.

It is in the production of signal lanterns, perhaps, that the firm is best known in railroad circles throughout the country. For years the concern has been a leader in the development of railroad signaling and in the electrification of signal lanterns. The tracks of the New England railroads are almost entirely equipped with Peter Gray lanterns. The company was the originator of the modern daylight lantern, by which light signals may be used in bright sunlight as well as by night. The latest product in this line is a daylight lantern equipped with an electromagnetic shutter which automatically closes when the signal is not set, thus preventing the rays of the sun from entering the reflector and reflecting false, or as they are termed by railroad men, phantom signals.

In addition, sheet metal-ware products and specialties are made at the Cambridge plant, including oil cans, oilers, waste and sprinkling cans, water pails, fusee cases, torches, water coolers and many other supplies for railroad use.

One entire floor of the factory is devoted to metal stamping presses and electric welding machines, where battery and fabric boxes, hot water bottles, desk calender stands, ear phones, moving picture projectors, clock cases, meter case covers, addressing machine parts, graphophone parts, electric heater parts, automobile parts and accessories, and parts for leather working, textile and shoe machinery are produced.

In the sheet metal department, safe boxes, tool boxes, ash barrels, wool boxes, and containers for all purposes, animal cages, milk inspectors' outfits, incubators, and a variety of apparatus for bacteriological laboratory use are among the products, many items of which have been standardized.

Candy case coolers, candy pans and trays and other metal supplies for confectioners are also lines which the concern features. It has lately specialized in the design and manufacture of stamped metal parts to replace castings, a field in which great progress has been made.

To meet modern conditions the manufacture of traffic signals and highway guides was undertaken a few years ago, and to the new and rapidly growing radio industry the company is supplying many parts required in the construction of sets, the stamped and punched steel chassis, various types of transformer and condenser cases, copper and aluminum shields, laminations and also cases for battery eliminators.

The company's factory is equipped with every modern facility for punching, stamping, japanning and finishing all kinds of sheet metal products. The possibilities for using sheet metal goods are unlimited and a definite part of Peter Gray & Sons' service is to assist in developing new ideas which help the customer to attain greater manufacturing efficiency or to produce a better product.

George M. Gray is president, Mason H. Gray, secretary and treasurer, and they with Peter Gray, constitute the directors. James M. Gray severed his connection with the company several years ago to engage in other business pursuits.

The corporation has capital of $111,900 and employs 125 operatives.

THE BARTA PRESS

The business which now bears the name of The Barta Press had its inception in 1880, when Louis Barta, a youthful employee of the Forbes Lithograph Manufacturing Company, began his career as a master printer by entering into partnership with Lorin F. Deland, under the firm name of Deland & Barta. Six years later Mr. Deland retired and Mr. Barta continued the business, using the style L. Barta & Company.

In 1900 the plant was moved to 28 Oliver Street, Boston, where it was established in much larger quarters than had previously been occupied and the name of The Barta Press was adopted, under which title the business was incorporated four years later.

With the intense energy which was characteristic of the man, Mr. Barta strove for the highest achievement of the printing art and had seen this ideal realized before his death, in 1907. Following his demise, the interests of the business were acquired by Harry A. Wheeler and Charles L. Dunton, who had for some years been associated with Mr. Barta; together with Harry A. Brown, who was experienced in the printing business, particularly along the cost accounting lines. Under the new ownership the enterprise moved forward, always maintaining the high standard established by Mr. Barta.

In April, 1921, the corporation moved into its own building at 209 Massachusetts Avenue, Cambridge, where it is now located. Of the three men who carried on after death of the founder, Mr. Wheeler is still closely identified with the business, as president and treasurer.

At a recent exhibit by The Barta Press in the main foyer of the National Shawmut Bank in Boston, one of the most interesting features was a textbook on catalogs published by that organization. This book, entitled "Modern Catalogs," treats very completely of the factors which the advertiser must take into consideration in the preparation and use of a catalog, and its application to present-day merchandising.

The book is illustrated by sixty examples of modern catalogs. It discusses the catalog from the viewpoint of sales, and describes the advantages and disadvantages of the eight kinds of catalog forms to choose from. There is a chapter on putting salesmanship into a catalog, and the last half of the book is given over to the discussion of various catalog problems and how they were met.

The corporation has capital of $240,000 and employs seventy-five operatives. John B. Sullivan, Jr., is clerk of the concern.

IRVING & CASSON-A. H. DAVENPORT COMPANY

Messrs. Irving and Casson began business in East Cambridge, in 1881, and fifteen years later were employing 200 skilled craftsmen in the manu-

facture of custom furniture. In 1896 A. H. Davenport established a large furniture factory on Bridge Street, East Cambridge, and later the two units were merged into the corporation known as the Irving & Casson-A. H. Davenport Company, which now employs 500 operatives. The main display rooms are at 575 Boylston Street, Boston, and offices are also maintained in St. Louis, Buffalo, Chicago, St. Paul, Washington, and New York City.

Arthur P. Irving is president, Charles P. Casson, vice president, Robert Casson, treasurer, and J. W. Bartlett, secretary. The corporation has capital of $700,000.

The enterprise has gained an international reputation in the high-grade custom furniture field, as well as in the art of interior decorating, interior finish, and wall hangings.

HATHAWAY BAKERIES, INC.

Just fifty years ago Charles F. Hathaway located in Cambridge, and began the baking enterprise which today is known as Hathaway Bakeries, Inc., and which operates fourteen factories whose combined assets are in excess of $4,000,000, with annual net sales of more than $10,000,000.

Born in Mechanics Falls, Maine, April 12, 1850, Charles F. Hathaway learned the trade of baker in Lewiston, and came to Cambridge at the age of nineteen years, where he worked for several years for two local employers. In 1875 he purchased a bakery, at Bath, Maine, which, with a partner, he operated for five years, when he returned to Cambridge and started business there.

In 1888 the enterprise was removed to a larger plant, and nine years later Mr. Hathaway acquired a long-established bakery, in Waltham, which he continued to operate. In 1901 he greatly enlarged the Cambridge plant, and nine years later built a new and modern factory, on Richdale Avenue. In 1912 the old Best Baking Company of Roxbury, was purchased and was operated until 1927.

The founder died in 1918, and was succeeded by his four sons—Lester G., Alton H., Elmer F., and Walter W. Hathaway.

In January, 1926, C. F. Hathaway & Sons became a Massachusetts corporation and several months later the Hathaway Baking Company was formed, which acquired C. F. Hathaway & Sons as a subsidiary. The same year the Hathaway Baking Company purchased plants located at Providence, Utica and Syracuse, owned respectively by the Grocers Baking Company and the Grocers Food Company, of Providence, and Boettger's Bakery, Inc., of New York state; in July, 1926, the plant of the Dube Baking Company, of Salem, and in August, 1927, the factory of the Grocers Bread Company, of Worcester.

In March, 1928, Hathaway Bakeries was formed and took over the Hathaway Baking Company, the Community Bakeries, Inc., with plants at Brockton and Brighton, and the Dolly Madison Baking Company, of Springfield, as subsidiaries. Steps were taken at that time to dissolve all subsidiaries except the Hathaway Baking Company and Community Bakeries, Inc.

In February, 1929, Hathaway Bakeries, Inc., acquired the three plants of the Wehle Brothers at Rochester, N. Y., Youngstown, Ohio, and Milwaukee, Wis.

The general offices are at 10 High Street, Boston, and the officers of the corporation are: president, Alton H. Hathaway; vice president and general manager, Walter L. Dietz; treasurer, Alton B. Hastings, Jr.; as-

sistant treasurer, Elmer H. Hathaway. Upwards of 1,200 operatives are employed.

At the inception of the concern its founder determined to produce a type of bread wholly dissimilar in character from the so-called "bakers' bread" of that period, which was a large fluffy loaf with but little flour or substance. By making a small, compact loaf and using a high percentage of milk, Mr. Hathaway produced a standard of bread that not only was appetizing, but similar to the best home-baked product of that time. The company's Massachusetts plants are located in Cambridge, Roxbury, Waltham, Brighton, Taunton, Springfield, Worcester, Pittsfield and Salem.

THE SIMPLEX WIRE & CABLE COMPANY

In 1840, the concern later known as Morss & Whyte was formed in Boston, Charles A. Morss becoming an active partner five years later, and from 1868 forward the sole owner. In 1885, the business was moved to Cambridge, where it occupied a brick factory, on Franklin Street, containing 35,000 square feet of land, in which the manufacture of wire cloth, screens, railings, and light structural iron work was carried on, some fifty operatives being employed. In 1923 Morss & Whyte sold the business to the Newark Wire Cloth Company, of Newark, N. J., and John G. Loring, formerly manager of The Morss & Whyte unit became one of the owners of the Steele Supply Company, which acts as the agent of the Newark Wire Cloth Company. It maintains a warehouse and office at 66 Hamilton street, Cambridge.

In 1895 the Simplex Electrical Company was incorporated, with capital of $150,000, and began operations in the Morss & Whyte factory, engaging in the production of insulated wires and cables for electrical purposes, including line work, interior wiring, submarine and underground cables.

Now known as the Simplex Wire & Cable Company it has become one of the largest and most successful businesses in Cambridge, employing upwards of 750 men, and having capital of $1,200,000.

Its management is vested in the descendants of Charles A. Morss, the president being Everett Morss, the vice president, Philip R. Morss, the treasurer and secretary, Henry A. Morss, who, with J. Reed Morss and Everett Morss, Jr., constitute the board of directors.

The Boston office is at 201 Devonshire Street.

In 1885, Charles Place began the production of fancy paper boxes and five years later enlarged his modest original factory, located in a cellar kitchen, to a building 150 feet long, five stories high, and employed 150 hands as against his original force of five. In 1893 an addition was built, 50 by 40 feet, and 250 employees were carried on the rolls, the products ranging from a tiny pill box to one large enough for use in the clothing and fur trades.

In 1886 Carlos L. Page & Co., began the manufacture of boxes, in a four-story brick factory, 75 by 40 feet, which, with other adjacent structures, covered an area of 40,000 square feet. About sixty hands were employed at the time the concern retired from business in 1897.

ARTHUR D. LITTLE, INC.

Diversified as are the manufactures of Cambridge, the city is unique as the home of the only plant of its kind in the United States—the industrial research laboratory of Arthur D. Little, Inc., located on Charles

River Road, near the West Boston bridge, and organized to provide the facilities and the means of inducting science into business.

Dr. Arthur D. Little's interest in chemistry began more than fifty years ago, and started with an experiment, which cost him all of his capital of a dime. While a student in the public schools of Portland, Maine, at the age of about twelve years, a classmate seated behind him inquired as to his worldly wealth, and Little after fishing through his pockets discovered that he had exactly what his inquisitor asked for, namely a bright, shiny dime. "Give it to me, and I'll show you some chemical experiments," said his school friend. Passing over his entire wealth, the two boys stopped at a drug store on their way home that afternoon, and with the ten cents bought a piece of glass tubing and a nickel's worth of sulphuric acid. On arrival at the home of his classmate, Little observed, for the first time in his life, the miracle of sulphuric acid and zinc producing hydrogen, but unfortunately the generator was improperly set up and exploded, but not before his youthful friend had deposited a piece of marble in the tube which operation was followed by the familiar hissing noise under the action of the acid.

Very much excited, Little sought his father and triumphantly announced that he was going to be a chemist, and from that hour he was definitely certain of his profession. His appetite for experimentation was unappeased. He studied the stars with a concave mirror and one evening announced, to the astonishment of a neighbor who was ignorant of astronomy, that he had "discovered the moons of Mars." It later developed that the tiny stars which Little had observed in his mirror, one on each side of the planet, were really multiple reflections. Consumed by his passion, he mixed every chemical he could obtain, with weird, odorous and explosive results, and even dared the elements by manufacturing hand grenades out of beer bottles, which he tossed over a fence, and gleefully awaited the crash of the subsequent explosions. Entering the Portland high school he was a mediocre scholar in the academic courses, but coming in contact with a science teacher, he became a prize student and so proficient in chemistry that he soon obtained the position of assistant in charge of the apparatus used by his tutor in his public lectures on that subject. Completing his preparatory education at the Berkeley School, in New York, he entered the Massachusetts Institute of Technology, from which institution seven of the ten most renowned research directors of today were graduated.

Financial pressure caused him to leave Tech after three years, and following a summer course in paper manufacturing at Amherst he became "part chemist and part clerk" in a pulp and paper mill, in Rumford, R. I., serving but six months before he was promoted to the superintendency of the company's pulp mill—the first in this country to manufacture sulphite wood pulp. During the winter of 1885 he was sent to Newbern, N. C., to establish another sulphite mill, and his place at Rumford was filled by Roger B. Griffin, who the following year became the senior partner in the consulting chemical firm of Griffin and Little, of Boston.

They located their laboratory in an ancient, dingy Milk Street building, with capital of $2,500, and at a time when six men were locally attempting to make a living by the commercial practice of chemistry.

Messrs. Griffin and Little confidently expected at the outset that they would do a gross business the first year of at least $14,000, but to their dismay they discovered at the end of twelve months that their income exceeded their expenses by only $600, which amount they divided, while

Little, even then a master salesman of research, hustled out to secure additional clients.

In a reminiscent mood, he recalls today that the firm was founded at a period when the fishtail gas burner was in vogue, and long before it was supplanted by the Welsbach mantle, while the few incandescent electric lamps of that era carried carbon filaments, since superseded by tungsten and the white light of argon-filled bulbs.

When he first began the study of chemistry he was taught that there were certain permanent gases, so termed because they could not be liquefied, but almost before he had learned the lesson, Pictet and Cailletet had liquefied oxygen, and since then liquid air has become a commonplace of the laboratory and the raw materials for gigantic industries. He was also assured by his instructors that the atmosphere contained only oxygen-hydrogen, a gaseous vapor, and a smattering of carbon dioxide, and yet he witnessed the results of patient laboratory research that uncovered five previously unknown gases—argon, the lazy one because it forms new compounds; helium, whose existence in the sun was revealed by the spectroscope before its discovery on earth; neon, the new one; krypton, the hidden one, and zenon, the stranger. He saw the lazy one put to work in incandescent lamp bulbs; he witnessed helium, possessing nearly the lifting power of hydrogen and non inflammable take its place as the key to safer navigation in the air in dirigibles, and to see neon tubes flash their advertisements to a wondering world as well as to become assistants to chauffeurs in locating engine troubles. Griffin and Little saw their business grow slowly, and they succeeded in getting enough income to buy out the business of one or two other consulting chemists, and ultimately they did the bulk of the sugar testing carried on in Boston.

By 1893 their total income rose to $375 a month, but that year Mr. Griffin was killed by a laboratory explosion. Little carried on the business alone until 1900 and in that year Dr. William H. Walker, of M. I. T. became the junior partner of Little & Walker. In 1909 the latter withdrew, and the company known as Arthur D. Little, Inc., was organized. Within two years Dr. Little built up a volume of business eight times larger than what it had been in 1904. The laboratories and offices were moved several times, as additional facilities became imperative. By 1917 the business was institutional in its character, and the clientele embraced all parts of the world. It was in that year that the magnificent three story and basement building was erected, in Cambridge, overlooking the Charles River basin, and adjoining the M. I. T. structures.

From the start of the concern, Dr. Little and his associates were imbued with a desire to accomplish the impossible, and their success in that line was well illustrated several years ago when a skeptical client dilating upon the uselessness of a certain raw material, remarked with some degree of positiveness, "you cannot make a silk purse out of a sow's ear." "Oh, can't I," replied Dr. Little, and to prove that ancient maxims, apparent impossibilities and hoary traditions wither under the glare of industrial research he proceeded to prove that his visitor was in error. From the gelatine and tissues contained in the ear of a female pig his associates produced a red and blue tasseled purse, which today may be seen in Dr. Little's museum, accompanied by jars in which are preserved the materials taken from the ear, in the various stages of artificial silk manufacture. Each side of the exhibit are affidavits from meat packers attesting to the truth of the experiment.

The Cambridge laboratory is divided into departments, one devoted

to petroleum, another to gas, a third to coal, and so on down the list. Much of the equipment is semi-commercial in size, and included in the assets is a complete paper and pulp mill, and in the yard adjoining an oil refinery of semi-works size. The paper mill is equipped with a combination Fourdrinier and cylinder paper machine, which can manufacture a roll of paper twenty-four inches wide. Fibres from all over the world have been run in this machine, and the possible application of many new processes has been studied.

The company's petroleum engineers are constantly traveling between the miniature refinery at Kendall Square and the oil fields of Texas.

An engineering department provides mechanical and civil engineers to assist in the designing of plants, and to assume full responsibility for their erection.

Accountants are carried on the staff to make not only financial but chemical audits as well, to determine the efficiency of manufacturing processes, the quality of raw materials, the wastes and methods of preventing them and the status of equipment. Dr. Little has been able, to a degree probably unequaled by any other living chemist, to translate theory into commercially practical developments.

At the Cambridge laboratory processes have been discovered for the manufacture of vegetable glue from starch, to recover turpentine and resin from yellow pine stumps, to extract zinc from complex ores, to separate potash from complex saline deposits and to manufacture a special paper from the waste products of the sugar mills of Hawaii, Arthur D. Little, Inc., having built such a plant at Olaa, Hawaiian Islands.

Complete studies in fuel processing and in the conservation of fuels have been made for such large users as the Edison Electric Illuminating Company of Boston, the Boston Elevated Railway Company and others.

When German imports ceased during the World War the Little concern developed the dry mats used by newspapers in stereotyping, and saved American publishers countless sums of money. They have evolved a practical method for manufacturing newsprint paper from Mississippi gumwoods which, when operated on a large scale, promises to effect substantial reductions in the cost of newsprint. It is now being demonstrated in a commercial paper mill.

Dr. Little himself is the inventor of processes for the manufacture of chrome-tanned leather, artificial silk, the electrolytic manufacture of chlorates, and, with his associates, of methods for the production of a long line of alcohols, and special products from a petroleum base. He has an international reputation as a specialist in the chemistry of cellulose, paper-making, processes of fibre treatment, and in gas and petroleum, while his studies in the field of industrial waste have not only saved sums impossible of computation, but they have kept many a corporation out of the bankruptcy courts.

Local ice cream and confectionery manufacturers have recently become interested in a new flavoring material developed by the Cambridge concern for the W. S. Quinby Company, makers of La Touraine coffee. This flavor was discovered during a research authorized by W. S. Quinby that included a scientific study of many phases of coffee preparation. Unlike most of the flavors previously on the market, the new product is understood to give a highly desirable true coffee taste.

Another interesting accomplishment of recent date was a classification of odors made by means of which a 4-digit number identifies any existing odor. For example, vinegar is 3803 and rose is 6423.

Dr. Little is the despair and the envy of his associates, as he possesses the ability to write clearly, smoothly, and with literary distinction in such a way as to be readly understandable by a layman.

In addition he is a philosopher and man of affairs, and many years ago he completely refuted the theory that men of science cannot make themselves heard along with lawyers, bankers, journalists and politicians.

Maurice Holland well describes Dr. Little as the "voice of research."

More and more are Massachusetts manufacturers turning to industrial research to solve their problems, and in Dr. Little's laboratory on the Charles they find the answers to their difficulties.

The corporation has capital of $750,000 and employs upwards of one hundred trained experts, the payrolls running considerably in excess of $1,000 each business day of the year.

Arthur D. Little is president, E. P. Stevenson, vice president, Alexander Whiteside, secretary, and Ernest R. Adams, treasurer, of the corporation, whose clients represent practically every state in the Union, and extend to Canada and Mexico.

The products developed, invented or improved in the Cambridge laboratory, and displayed in the industrial museum at the plant, include some of the best known articles of commerce.

The technical staff compares favorably with the faculties of the leading technical schools of the country. A portion of their activity is devoted to pure science but in a large measure, their services have direct industrial application, developing new articles of commerce, overcoming manufacturing difficulties, and installing technical control for plants, using chemical processes.

E. P. SANDERSON & COMPANY

In 1886, when you could buy a ton of coal for six dollars, and a pound of beefsteak for eighteen cents, and when the butcher handed you a good cigar on the settlement of your bill Saturday night; in that era when a telephone was a novelty as well as a luxury, when golf was an octogenarian's game, and when dancing and dining were separate functions, the manufacture of wagons and carriages was a flourishing business. It was in that year that Messrs. E. P. Sanderson and Amasa Harrington reached the conclusion that they could succeed in the business of distributing steel, iron, hardware and supplies to the trade in general and to the carriage-making industry in particular, and with $1,700 capital they established an office and warehouse, in Boston, which was soon outgrown, and in 1888 removal was made to another location in the Hub, where it remained for twenty-four years.

The growth of the business without further cash investment to its present capitalization of five hundred and fifty thousand dollars is due to nothing less than the good management and sound business policy displayed and adopted from the very start by the founders of the business, and maintained throughout the intervening years.

In 1912 the E. P. Sanderson Company took what seemed to be a revolutionary step when it removed from Boston to Kendall Square, Cambridge, but its growth since then has been greater than that attending its operations during the time it carried on its activities in Boston.

The Cambridge plant has 75,000 square feet of floor space, is equipped with every modern warehouse necessity, and with a private railroad siding having a capacity of ten cars, while three large traveling cranes enable the company to expeditiously handle the immense stock.

The company carries the largest assortment of iron, steel, heavy hardware and kindred goods in New England, including supplies and tools to accommodate both the smallest machine shop and the largest manufacturer. Among the more important lines are structural shapes, black, blue annealed and refined sheets, galvanized sheets, cold rolled strip steel, machinery steel, soft steel in flats, bands and hoops, cold rolled screw stock, plates, tire steel and all that could be expected to be found in the line of heavy hardware and supplies down to bolts, nuts, washers, screws, rivets and a multitude of similar items.

A staff of seventeen traveling salesmen keeps the trade in touch with the company's stock and service, while in the office and warehouses a force of fifty people is employed.

President E. P. Sanderson, vice president Robert M. Vaughn, and Amasa Harrington, secretary, served the concern in these three positions from 1888 to 1929, when the E. P. Sanderson Company was acquired by the Wm. T. Ryerson Co., and there was formed the firm of Cutter, Wood & Sanderson.

H. F. Sparrow began the manufacture of chocolates, bonbons and caramels in 1887, in a two story building on Windsor Street, and four years later erected his own factory, at the corner of Hampshire and Clark streets, 110 by 45 feet in size, four stories high, with a basement, and became the employer of 175 operatives.

PAGE & SHAW

From a modest little candy shop, established at 9 West Street, Boston, in 1888, to a six million dollar business a year is the story of Page & Shaw, which forty-two years later operates not only its own retail stores in Boston, New York, Philadelphia, Detroit, Chicago, San Francisco, Los Angeles, Rochester, N. Y., Pasadena, Lynn, Salem, Pride's Crossing, Glacier National Park, Montana, Montreal, Ottawa, Toronto, Paris, and London, in all of which places an aggregate of thirty-five shops are conducted, but also candy factories in Cambridge, New York City, Philadelphia, Boston, Chicago, San Francisco, Los Angeles, Montreal and London, and chocolate and box factories, in Cambridge.

With no reputation to lose, Page & Shaw might naturally have yielded to the temptation which besets manufacturers of sacrificing quality for quick profits, but such a course did not appeal to the founders who, regardless of expense or of profits, firmly determined to use only high-grade materials, and to exercise the utmost care in the process of manufacture.

The earlier every-day methods of production were rapidly replaced by novel improvements, which revolutionized the manufacture of candy, the firm being the first to employ modern refrigerating methods in dipping chocolates, thus preventing the fats from working to the surface, and turning the candy gray in color.

The development of the business was slow, but steady, depending not upon advertising, but upon the personal recommendations of satisfied customers, the giving of full weight, and in refraining from the use of any synthetical substitute for pure raw materials.

The original West Street shop still holds the record as the busiest candy store of its size in the world.

It was not until Otis Emerson Dunham, now president of the corporation, acquired the control of all the common stock of the company, about ten years ago, that its ramifications became world-wide. He established branches and stores in England and France, built a large modern factory

in Canada, erected a half-million-dollar chocolate plant in Cambridge, more than doubled the number of retail branches, quadrupled the total of distributing agencies, increased the annual sales more than six-fold, and arranged to sell the products of Page & Shaw, not only throughout this country, but in Canada, Europe, Asia, South Africa, South America, Cuba, and Australia. Regular shipments are made monthly to the offices of large mining companies in Peru and Mexico City, the confections being packed in air-tight, galvanized iron boxes, while in the Arctic circle Page & Shaw candy is bartered for valuable skins at some of the far-North ports of the Hudson Bay Company.

A tremendous mail order business has been built up, and the concern is the only company engaged in the production of candy that carries on manufacturing operations in four countries of the world.

The concern makes everything it markets, and trained men are constantly seeking every possible improvement that pertains to the production of over 1,100 varieties of confections.

A factor that has aided in establishing the record of Page & Shaw, other than the quality of its products, has been the utilization of the ancient art of the Moors in adorning the world-famous shops and packages.

President Dunham hit upon Moorish designs as most original and distinctive, and spent many years searching for the best and most authentic books on Moorish art, and at length discovered a volume that comprehensively covered the entire sweep of the subject. Guided by its descriptive text and illustrations, he began furnishing the stores with that impressive touch that gives life to geometrical figures. Prohibited by the tenets of their faith from representing life, plant or animal in their art, the Moors early learned to give to the prosaic lines of geometrical design, that brilliance and vivacity which so distinguishes their designs. The fine tracery of lines, the grace of many sweeping canoes, and the weaving of the three primary colors,—red, yellow and blue—into a blend that is unique, were transferred to the Page & Shaw store decorations and to the candy boxes.

Artists from France and England, and from the Orient were drawn upon to ornament the packages, and assisting President Dunham in this work is M. Pierre J. Sequin, a French designer, who won a croix de guerre as sergeant in the first camouflage company, in the World War, and who spent twelve years specializing in Moorish art before becoming a member of the decorative staff maintained by Page & Shaw.

The Cambridge factory, where more than 6,000,000 pounds of chocolate candies are produced annually, probably has no equal in cleanliness, ventilation, lighting arrangements, and comforts and convenience for the health and welfare of its employees. Its interior shows the most elaborate decorative scheme employed in any manufacturing plant in the United States. The stairways have continuous scenes extending from floor to floor, while in the work rooms are extensive landscapes, depicting beautiful scenes from all over the world. The assembly and dining room is similarly treated, and is equipped with a player piano. All employees are paid a weekly bonus, besides the annual bonus based upon length of service and efficiency.

The Cambridge chocolate factory is owned and operated by Dunham & Kattwinkel, Inc., a subsidiary corporation, all the common stock being owned by Mr. Dunham. The plant is sanitary and dust-proof, and adjoins

the candy factory. It is equipped with the latest types of chocolate milling and bar-wrapping machinery.

In the box factory several million boxes in over two hundred varieties are produced annually, together with all the paper supplies for the packing rooms, and for the retail shops. Here also is the company's printing department, where all the embossing and gold work is done, besides the regular printing.

The Canadian business is conducted by Page & Shaw (Canada) Limited, a corporation owned by President Dunham, and in every community having a population of a thousand persons or more, an agency is maintained.

The English company, known as Page & Shaw, Ltd., is also owned by Mr. Dunham, and the factory is located at Kensington, aeroplane deliveries being made from there of many of the delicate varieties to the Paris shops.

Page & Shaw scour the world markets for the choicest of raw materials. Each year the company places about twenty tons of pure butter in refrigerators because it has been found that the product made when cows are securing fresh, green grass has a better flavor than is obtained later in the year. The finest white comb honey, Clermont cherries from France, the best Mayette and Chabert walnuts, true fruit flavors, and the best quality of cocoa beans are used by the concern. Over five hundred different materials, coming from all parts of the world, are required, and while the books of the company carry the names of upwards of 10,000 wholesale accounts, covering five countries. The easiest part of the Page & Shaw business is to sell its products, and the greatest difficulty it experiences is in overcoming the droughts, wet seasons, crop shortages, strikes, wars, plagues, new customs regulations, changes in food laws, and the fluctuations in the rates of exchange all of which affect the required flow of raw materials, and the prompt deliveries of its confections.

President Dunham holds many improvements on candy and chocolate machinery, and one for the manufacture of vitamine chocolate, this commodity being supplied to hospitals and sanitariums, and it has been used on relief expeditions to Russia, Labrador, and China.

The company officers are Otis Emerson Dunham, president, and A. C. Crehan, secretary. Upwards of 1,200 operatives are employed, and the corporation has capital of $1,000,000. Dunham & Kattwinkel, Inc., has capital of $1,000,000 and employs fifty hands. Otis E. Dunham is president of that unit, A. C. Crehan, secretary and Max Kattwinkel, treasurer and general manager.

THE PART THIS SECTION HAS PLAYED IN CONTROLLING THE BUSINESS ACTIVITIES OF AMERICA

Cambridge plays an important part in controlling business operations in all parts of the United States. Record cards for every type of vertical and visible filing system are manufactured in the Remington Rand factory there, the output of the local plant contributing materially to this company's daily production of 2,750,000 cards.

In the Cambridge factory more than 450 men and women are employed in the processes of printing and die-cutting the card forms. Tons of rag are consumed each day in the manufacturing of the card stock in another of Remington Rand's factories, located in Huntington, in this state, rags being the principal ingredient of the card stock because of the necessity for durability and strength.

For many years Cambridge was the headquarters of the Library Bureau, a $3,000,000 corporation, with seven factories in America and foreign countries—3,000 employees and 60,000 customers. Today, this corporation is one of the most important units of Remington Rand, having affiliated with the latter interests in the fall of 1925.

In 1888, H. E. Davidson of the Library Bureau conceived the idea that the card, then in fairly general use in libraries, could be adapted to certain commercial indexes. Although he had no exaggerated conception of the value of his idea, he had really discovered a science which, through the medium of the card system, revolutionized business methods in the succeeding twenty years. It was the birth of the science of business systems, now one of the principal interests of Remington Rand Business Service.

The corporation was immediately swept forward by a power far beyond its control. The constant cry was for more men, for new factories, and for larger capital, to keep pace with the daily development and the increasing demand in all parts of the country for card record systems.

From the first application of the card system to commercial records, its tremendous advantages over book records was apparent—because of the much greater flexibility which it permitted. The card records could be kept live and up to date. The direct result was that the most laborious part of the ordinary routine of a business house was reduced almost one half, and a great burden of fixed expense, previously deemed inevitable, was directly saved.

An early example of this plan was found in the policy department of one of the great New York Life insurance companies. A very simple application of the tab card system to its record of policy expirations saved the corporation a clerical expenditure of $40,000 the first year the system was used.

Development of record systems, resulting from the application of card files to business, gave birth to one of the great discoveries in modern business—namely, that the most costly waste in the routine of a business house and the most troublesome complications are not hidden away, but that they fall under certain broad, simple heads, such as excessive inventory, waste of machine and man-time by poorly planned production and high sales cost. It was ascertained that these faults could be corrected through the study of records.

The accessibility of card records also was responsible for the development of the unit record set-up, an important step in business management. Unit sales records analyze the totals for each customer, for each salesman, in each territory, and indicate the weak points in the goods, in each salesman, and in each sales policy. They show him where these are cutting profits, and why, and give him the exact facts he needs to correct the errors.

By the unit record system of manufacturing cost, the cost of each order going through the factory, and of each process, is exactly known, while the efficiency of each machine, of each man, and of each method, is analyzed and compared. The reason for every fluctuation in cost and result is known, and facts can be collected, analyzed and compared by fixed methods of almost automatic simplicity.

Card record systems also made it possible to secure this vital sales and production information in time to check weaknesses and losses, affording a detailed report of the sales and production picture, from day to day. Formerly a business house discovered only at the end of the year that its

current expense, or its manufacturing costs, had increased, or that its profits or volume of business had shrunk.

The mischief having been done it was necessary to dig into the business of the period and to attempt the difficult task of discovering, without the assistance of any classified data, where the fault lay.

In the past fifty years the Library Bureau has applied these principles of record keeping to every field of commercial activity and to every department and every record of a business house: accounting, purchasing, stockroom, manufacturing, advertising, sales, credits, orders, shipping, correspondence, auditing; to public service corporations of every kind and size; to banking institutions; to municipal, state and federal offices and to the professions.

The task was huge, as the number of records involved was almost countless. Each new application meant a new problem to be worked out in its own terms, and each system had to be exactly adapted to the specific work it was expected to perform.

The material growth of the Library Bureau kept pace with these scientific developments, and selling branches were established, until finally there were Library Bureau units in thirty cities in this country.

In 1893 the English branch was established. The task of introduction to the ultra-conservative British business man was long and arduous, but today Library Bureau systems are in operation in hundreds of the most important houses in Great Britain. Five selling branches were established in England, and a card factory was erected in London.

The Library Bureau's Canadian business was established in 1903 and the work is progressing under Remington Rand Control.

In 1907 a branch of the Library Bureau was established in Paris. To carry on the work of these branches the Library Bureau built up one of the most highly developed selling organizations in modern business.

Its first factory was built in Boston, where card and wood-working activities were carried on. This was followed, a few years later, by similar plants in Chicago to supply the western business, these showing in fifteen years a 400-fold growth.

The expansion of the Boston factories can scarcely be expressed in figures. At the outset the card plant consisted literally of two card cutters, with a boy and a girl to run them, while the cabinet factory was scarcely more imposing.

Development came so swiftly that it was impossible to estimate future growth even from year to year. Every few years the experience was repeated of moving into quarters which seemed absolutely beyond all possible future requirements, only to find a year or two later, that the error of judgment had been on the side of conservatism.

In 1898 the New York card factory was established to secure the promptest possible deliveries on the large volume of business passing through the New York branch.

When the English card factory was opened in 1904 it was the only manufacturing establishment of its kind in the Old World.

The Library Bureau's card factories are among the most highly specialized manufacturing establishments in the world. Filled with special machinery, invented largely by the corporation's own mechanical experts, their product is turned out with almost incredible accuracy and precision, and in extraordinary volume.

Thirty-eight years ago the purchase of a ton of card stock was a large

transaction for the Library Bureau. At the present, the four card factories use more than seven tons of card, guide, and folder stock each day.

In addition to card and filing cabinets, the Library Bureau's woodworking factories manufacture office, bank, and library furniture, and fittings of nearly every kind.

In 1909 a wood and steel plant was established at Ilion, N. Y., where business furniture, filing devices, vault fittings, and special metal work of every description are produced.

Another unique activity of the Library Bureau is its Indexing Service, which covers a wide and interesting range of work. It methodizes book records and transfers them to cards, organizes correspondence filing systems, and tabulates statistics, being the only organized service of the kind in existence.

In the last quarter century the science of visible index records has been perfected. Most of the pioneering and development work in this field has been done by the Rand and Kardex units of Remington Rand, but the Library Bureau, always a leader, helped perfect the cards used in the Visible filing systems, and today its factories manufacture the greater part of the cards used in the Remington Rand Visible files.

In November, 1925, James H. Rand, Jr., of the Kardex Rand Company, a corporation manufacturing visible record systems, convinced the officials of the Library Bureau that a consolidation of the two companies would bring about economies in sales and operating costs, and these two large corporations were merged.

Mr. Rand's idea was to establish a business service corporation that would manufacture and distribute equipment for every type of office work, record keeping, and filing. He believed the unifying of the manufacturing and sales organizations of the two companies would result in a substantial reduction in sales costs.

Twelve nationally-known organizations and many subsidiaries were consolidated under one central management to make up the Remington Rand Business Service, as follows: the Remington Typewriter Company established in 1874; the Library Bureau, established in 1876; the Baker-Vawter Company, which was formed ten years later; the Rand Company, which began business in 1898; the Dalton Adding Machine Company, which was established in 1902; the Safe Cabinet Company, which was founded in 1904; the Kalamazoo Loose-Leaf Binder Company, established in 1906; the Noiseless Typewriter Company, which began manufacturing two years later; the Line-a-time Company, which was founded in 1912; the Index Visible, Inc., formed the same year; the Powers Accounting Machine Company, established in 1913 and the Kardex Company, which was formed in 1915.

The consolidation of these companies, which was effected in the period from 1925 through January, 1928, marked an important step in the modern reformation of office practice.

The historic industrial reformation, which the application of machinery and power brought about, took place in the latter part of the eighteenth century, but a hundred years later bookkeepers were still sitting in their offices and adding columns of figures in their heads, while men and women were still writing letters, posting bookkeeping information, checking invoices and keeping the payroll by hand.

Although unaccountably tardy, the reformation in office practice began in the latter part of the nineteenth century with the invention of the typewriter, the adding machine, and card records. Business executives were

amazed at the speeding up of office work which became possible, with the invention of machines for posting, billing, and keeping records, and with the advent of new filing systems. At last the office began to keep pace with the factory in its endeavor to make profits for business.

Summarizing the developments in the field of office equipment, Thomas A. Edison, the famous American inventor, has written:

"The major portion of the products of this industry contribute economy, convenience and facility to business of every kind. These instrumentalities eliminate the confusion that would otherwise attend the ever increasing number of operations recorded in the business office. They give checks to extravagance; protection against leaks; elimination of lost motion; they return their purchase price in economies effected."

In recognition of the rapid expansion of industry and business in Massachusetts and New England, Remington Rand has established a network of sales and service branches throughout the entire region. Thus specialists in the application of accounting and bookkeeping machines, and all types of filing and record systems to problems of business and office operation, are aiding business men in this section of the nation.

THE FRANK H. DAVIS COMPANY

In 1884, Frank H. Davis founded the company which bears his name, and began operations in Holyoke, removing to Cambridge, five years later, beginning manufacture there on the present site on Richdale Avenue, then known as Crescent Avenue, in a small way, and erecting the first building of the present plant, in 1897. Since then many additions have been made, and following the death of the founder, in 1918, the company has been conducted by his three sons—John F., Chester P., and Franklin B. Davis—as a partnership.

Upwards of thirty skilled mechanics are employed in the production of paper mill machinery.

WALTER W. FIELD & SON, INC.

In the late '80s, Walter W. Field, who became an apprentice in the Kendall Square factory, operated by Messrs. Rawson & Hittinger, began business in his own name, and in 1910 incorporated the concern known as Walter W. Field & Son, Inc.

The concern is one of the pioneers of the Kendall Square section and with its completely equipped machine shop where special machinery is built, contractors' equipment repaired, and general machine work carried on. A specialty is the handling of a line of hoists and derricks, manufactured by the Lambert Hoisting Engine Company, portable air compressors, made by Metalweld, Inc., air tools produced by the Cleveland Rock Drill Company, swinging engines manufactured by the Dake Engine Company and steam boilers and engines, produced by the A. B. Farquhar Company. Recently they took over the maintenance of pumps and compressors in this locality for the Worthington Pump and Machinery Corporation.

Walter W. Field is president and W. Stanley Field, treasurer, of the corporation, which has capital of $25,000.

THE STANDARD ACTION COMPANY

Cambridge has long been famous for its production of pianos, and for upwards of forty years The Standard Action Company has been the

maker of quality piano actions, which have won a definite place in the piano industry, through the merit of their supreme quality.

They enter the world's finest musical instruments, and manufacturers choose them because the working part of a piano and the workmanship embodied in these actions constitute a very vital part in insuring piano satisfaction.

On January 1, 1889, David A. Barber, George Bates, and Willis Mabry formed the Standard Action Company and the following year, Horace T. Skelton was admitted as an equal partner.

In recent years the company has engaged in national advertising not only to feature its own product but to promote the sale and appreciation of fine pianos.

A new building completed in 1927, is now occupied by the company. The plant occupies a city block, containing about two acres, with frontage on five streets, and adjoins the grand junction division of the Boston & Albany Railroad. The equipment and machinery are the most modern obtainable and the plant is electrified throughout.

The corporation has capital of $50,000 and employs upwards of 300 operatives. C. L. McHugh is president and treasurer, A. W. Johnston, vice president, and Alton W. Mabry is secretary.

George R. Oliver began the manufacture of piano cases in Cambridgeport, in 1888, and for many years he employed fifty operatives.

Sylvester Tower was for many years the producer of piano keys and organs, carrying on the business in a group of buildings, located at 145 Broadway.

LAMB & RITCHIE COMPANY

For more than forty years the Lamb & Ritchie Company has specialized in the manufacture of its famous conductor pipe "Galvanized after Formed," which is considered as having no superior in the market.

The manufacture of galvanized iron pipe was a slow and unsatisfactory process in the seventies and eighties. When the seam was effected, the zinc coating cracked or broke off, thus exposing the iron or steel to rust, and for the same reason short lengths could not be successfully soldered together to make pipe of suitable dimensions. At best the pipe was unsightly, and it was indeed an expert workman who could produce 250 feet in a day.

The first successful steps in the industry were not designed to make the pipe cheaper, but to make it more serviceable, and it was not until Lamb & Ritchie applied power machinery to the problem that the manufacture of it began its remarkable growth. One of the machines designed and built by the concern produces more pipe in a day than the most skillful workman could turn out in three months.

In addition to its regular line, which includes gutters, fancy heads and straps, and other sheet metal products, galvanized and copper, the concern has lead-coated many tons of copper sheets for shipment to all parts of the United States.

The corporation has capital of $200,000, and employs fifty-five operatives.

Fred E. Ritchie is president and treasurer, Charles F. Barker, secretary, and Sargent S. Stearns, assistant treasurer.

RIVERSIDE BOILER WORKS, INC.

In 1889 the Riverside Boiler Works, Inc., was formed, and today 55,000 square feet of manufacturing area are utilized, while 200 hands are employed.

The company is engaged in the manufacture and installation of hot water boilers and gas heaters, and of the Riverside tank heater, designed by Elmer S. Stack, who originated the idea of using upright copper tubes in a heating coil.

The concern carries on an extensive national business in range boilers and expansion tanks, large stocks of which are carried in its own warehouses in New York, Chicago and Los Angeles. Its products are handled by jobbers of plumbing supplies in practically every state in the union, and agents are located in Cuba and Mexico. Sales offices are located in New York, Buffalo, Pittsburgh, Philadelphia, Montreal, Jacksonville, Louisville, Chicago, Denver, Salt Lake City, San Francisco Los Angeles and Seattle. . .

A Riverside product known all over the country is the Kantleak range boiler the construction of which is unique in that it is both riveted and welded, thus producing maximum strength and absolute tightness.

John S. Nicholl is president and treasurer, and R. S. Wayland is vice president, secretary and clerk, of the corporation, which has capital of $350,000 and which employs 150 operatives.

THE CAMBRIDGE OF FORTY YEARS AGO

The prophets of despair who take delight in magnifying the departure from Massachusetts of a single manufacturing concern, or who gloat when a unit dies from "dry rot," have a problem on their hands in accounting for the transformation of the city of Cambridge, which, from its very beginning, has been regarded as a cloistered municipality whose citizens were interested only in exhuming nuggets of classic lore from the musty tomes of an erudite past, into the third in industrial importance among the thirty-nine cities of Massachusetts, and all within less than a quarter of a century.

They might derive some solace by turning back the pages of time and reading a statement made by an author, who issued a history of Middlesex County, in 1890, in which he wrote at that time:

"Cambridge, although not laying claim to being a large manufacturing center, has within its borders some very important establishments, which have a world-wide reputation." Of the eighteen concerns specifically enumerated by the historian of that era as being "important," only ten survive under the same or similar cognomens—the Riverside and University Press; the American Net & Twine Company; Henry Thayer & Co., manufacturing chemists; the American Rubber Company; the cooperage department of the Revere Sugar Refinery; the Page Box Company, then known as the George G. Page Box Company; Barbour Stockwell Company; John P. Squire & Co.; A. H. Hews & Co., Inc.; and Alvan Clark & Sons Company.

The other concerns mentioned in the historical articles quoted—the Charles River Iron Works, the Cambridge Rolling Mill, F. H. Holton & Company, Wm. Campbell & Co., several manufacturers of soap, including the famous "Welcome" brand, the Kennedy Bakery, which went the way of the merger route, and some noted carriage manufacturing units have been superseded in the march of progress by new industrial enterprises

of greater size and importance than those of four decades ago. Unfortunately, the historian of the period omitted to mention by name some old-established concerns then existent, including so famous a unit as the Boston Woven Hose & Rubber Company, which was established more than a half century ago; the Shaw Furniture Company, the Dover Stamping & Manufacturing Company, H. M. Sawyer & Son, W. C. H. Badger & Co., the A. & E. Burton Company, the George W. Seaverns Piano Action Company, the Standard Diary Company, Wheelock, Lovejoy & Co., founded in 1850; Peter Gray & Sons, which began business in 1878; The George Close Company, Walter W. Field & Son, Inc., the Lamb & Ritchie Company, the Standard Action Company, the Cambridge Gas Light Company, the Broadway Iron Foundry Company, the Riverside Boiler Works, the Alden Speare Sons Company, Whittemore Brothers Corporation, the National Casket Company, John Reardon & Sons Company, the Standard Turning Works, the Reversible Collar Company, the J. L. Hammett Company, Ginn and Company, D. M. Hazen & Co., the Boston Bridge Works, Inc., the Ivers & Pond Piano Company, the Simplex Wire & Cable Company, E. P. Sanderson & Company, and other Cambridge concerns which were in operation, prior to 1890.

THE NEAPOLITAN ICE CREAM COMPANY

In 1890, Franklin Kronenberg, then living at 15 Lexington Street, Charlestown, began making ice cream in his spare hours, which he sold to his friends and neighbors. The venture proved so successful that a year later he opened a small store at 37 Elm Street, in Charlestown, where the business developed to a size that warranted establishing a plant at 199 Main Street, which was removed in 1898 to a factory, at 56 High Street, where he installed a gas engine and refrigerating plant, the capacity of the equipment being 140 gallons of ice cream per day.

In 1906 Mr. Kronenberg incorporated the Neapolitan Ice Cream Company and the manufacturing equipment was removed to a part of the C. Brigham Milk depot, on Massachusetts Avenue, Cambridge, where it remained for seven years when the company's present modern plant was erected on Penington Street, and opened in October, 1913.

The corporation has capital of $250,000 and employs upwards of 100 operatives.

Franklin Kronenberg is president, Leonora K. Macey, secretary, and Justin F. Kronenberg, treasurer, they, with Nelson D. Kronenberg constituting the board of directors.

SOME LOCAL ENTERPRISES OF THE NINETIES

In 1890, the New England Spring Bed Company was established in Boston, removing to Cambridgeport, where it made a specialty of manufacturing special spring beds and woven wire cots, employing some forty operatives.

The firm of Hall Brothers was established at 724 Massachusetts Avenue in 1890, to manufacture Hall's Matrix drying machine, and special machinery for the stereotype departments of newspapers, and within five years thereafter most of the leading publishing houses in the newspaper field were equipped with the machinery produced at their plant. The concern also manufactured a lubricant for motors and dynamos.

In the nineties the largest privately-owned mechanical engineering office in the United States, was that carried on by E. D. Leavitt, who occupied two floors at 2 Central Square, where machinery and boilers,

with their accessories, exceeding in volume more than ten million dollars were designed by him, including the great plant of the Calumet & Hecla copper mine, the most powerful engine then in existence, which was installed by the Bethlehem Iron Company in forging armor plates and heavy guns, and which developed 15,000 horse-power.

J. S. Bell & Co., began the manufacture of confectionery on Pearl Street, in May, 1890, and was soon succeeded by the Bay State Confectionery Company which moved into new quarters, at 141 Hampshire Street, in September, 1891. This property was purchased by the concern in June, 1894, being 70 by 40 feet in size, and four stories high. Approximately sixty hands were employed.

THE DAGGETT CHOCOLATE COMPANY

In 1891 F. L. Daggett was operating a small retail candy store, in Chelsea, and attracted by the larger sphere of wholesale activity, he moved the following year to Haverhill Street, Boston, and in 1906 established his business in a six-story building, at Lewis Wharf, in that city. Within fifteen years thereafter his business had grown to such an extent that he was carrying on manufacturing operations in seven different buildings, in the Hub, and in 1925, desiring to concentrate production and distribution, and to secure more manufacturing area, he erected in Cambridge a six story plant 400 feet by 80 feet in width, which with an annex built a year or more ago affords over 200,000 square feet of floor area.

Here every working day in the week five tons of cocoa beans are roasted and blended with cane sugar and vanilla beans, producing over nine tons of rich chocolate coating which is used to cover velvety creams, nuts, fruits, and specialties that are packed in 24,000 fancy boxes, the box plant of the concern having a capacity of that number.

The company's fruit syrup department supplies thousands of gallons of syrups, crushed fruits and orangeade to druggists and ice cream manufacturers, and the annual sales of the concern exceed $3,000,000.

For the past twenty-nine years Mr. Daggett has owned and operated during the berry season, a strawberry plant at Norfolk, Virginia, where the finest of strawberries are preserved in sugar for the ice cream and soda fountain trade. Three hundred and fifty thousand quarts of ripe luscious berries were required last season to fill this demand.

It is interesting to note that the magnificent plant of the Daggett Chocolate Company stands on the site where but a few years ago the city of Cambridge installed an extensive incinerator, on Main at the junction of Sixth Street. It proved to be a liability rather than an asset, but the discriminating eye of F. L. Daggett saw that the location was ideal for his purposes, and today instead of the terrain being owned by the municipality with no revenue accruing from it the site is occupied by one of the city's most up-to-date manufacturing plants which pays the people of Cambridge good dividends in the form of local taxes.

The Daggett Chocolate Company has capital of $500,000 and employs upwards of 400 operatives.

Fred L. Daggett is president, Arthur P. Stone, secretary, Frank H. Folsom, vice president, Alice W. Daggett, treasurer, and Harry P. Kitfield, assistant treasurer.

THE SQUIRREL BRAND COMPANY

The Squirrel Brand Company was established in 1891, and began business on Dudley Street, Roxbury, the concern being acquired by Perley G.

Gerrish and Fred S. Green, in 1900. Four years later they erected a modern factory, at the corner of Main and Portland streets, which was later purchased and is now occupied by the Olmsted-Flint Corporation.

In 1914 a new plant was built by the Squirrel Brand Company on Boardman Street, and on the death of Mr. Green, in 1916, Mr. Gerrish became the sole proprietor of the enterprise, which he incorporated in 1928.

Specializing in salted nuts and nut confections the concern today employs upwards of eighty operatives, and its products are marketed throughout the country.

The Nelson Carriage Company was established in 1891 by Joseph L. Nelson and engaged in the manufacture of a general line of carriages and wagons.

THE POOLE PIANO COMPANY

In 1892 William H. Poole established the Poole Piano Company, the original plant being located on Appleton Street, in Boston. In 1912 the corporation purchased the factory formerly owned by the Seaverns Piano Action Company on Sidney Street, Cambridge. Upon the death of the founder, in 1915, his son, Asa W., became the sole proprietor of the enterprise. Two years later the concern was incorporated with capital of $100,000 and with Asa W. Poole as its president. On January 1, 1928 the company moved to 195 Albany Street, where it leased space in one of the buildings owned by the Stimpson Terminal Company. The Sidney Street factory was sold at that time to the Standard Action Company and Shepard Pond, treasurer of the Ivers & Pond Piano Company became treasurer of the Poole Piano Company, but the two concerns constitute separate corporations, and the Poole piano is still produced under the name it has borne for nearly forty years.

A. W. Poole is president, H. L. Davis, vice president, Shepard Pond, treasurer, and T. P. Day, clerk, of the corporation, which produces not only pianos but player pianos as well.

THE KINGSTON KNITTING COMPANY

In 1892, the late James W. Brine, a native of Cambridge, became interested in the development of the knit goods business, at a time when knitted sweaters, jerseys and stockings, were coming into use particularly in the bicycling field. Knitting machines were primitive and crude at that perod, and the Shaker colonies at Enfield, East Canterbury, Harvard, and elsewhere, were the principal exponents of knitted goods, which they produced on hand presses. For years, Mr. Brine had been closely identified with the marketing of their products, and in 1892, he formed the Kingston Knitting Company which in the intervening thirty-five years or more has attained a favorable name among competitors, jobbers and retailers as the producer of high quality and serviceable knitted outerwear.

Following his death, his son, Louis C. Brine, became president of the company, and for many years thereafter his other sons, Arthur N., Edward D., Ernest F., James F. and Joseph W. Brine were vice presidents, while Herbert V. Brine, another son, was treasurer of the concern until his death, in 1910.

In April, 1921, the company removed from 37 Kingston Street, Boston, where its first factory was located, to its own new factory in Kendall Square, a splendid three story brick building, in which nearly 200 hands are employed.

The company manufactures sweaters, jerseys, bathing suits, stockings, caps and similar knitted goods, which are produced without seams, on the most improved machinery, and finished by hand.

The company's knitted garments are produced by two methods. By one process the knitted fabric is cut according to a pattern and then sewed by machine into the shape of the garment desired, after which it is finished by hand. The other method knits the garment on a machine which fashions the fabric to conform to the shape of the particular garment, sewing it by machine and finishing it by hand.

The company has capital of $38,800 and the officers are: president and treasurer, Louis C. Brine; clerk, Edward D. Brine; directors, the above and Arthur N., Joseph W., James F., Ernest F. Brine, and Edward F. Carroll.

The corporation employs upwards of 150 operatives.

In 1892, Adolph Sommer established the Viscol Company, and fourteen years later he purchased 80,000 square feet of land at 182-204 First Street, upon which he has developed a plant where upwards of fifty operatives are employed in manufacturing erasers, rubber substitutes and waterproof compounds.

SOME CONCERNS ESTABLISHED IN 1893-1894

The Connecticut Steam-Stone Company, a branch of the Connecticut Steam Brownstone Company, of Portland, Conn., was incorporated in 1893, and located a plant on First Street, East Cambridge, where from 125 to 150 men were employed.

The Bay State Metal Works were incorporated in May 1893, to manufacture copper and brass goods for the use of plumbers. The company was capitalized for $35,000 and soon was employing seventy-five men in its plant on Harvard Street, Cambridgeport. The original officers were Andrew W. Fisher, president, Joseph J. Devereux, treasurer and F. H. Holton, general manager.

The Standard Brass Company was organized and incorporated in May, 1894, with capital of $15,000, and located its plant on Osborn Street, where one hundred hands were employed in the manufacture of brass work for the water, steam, gas, and electrical lamp trades. F. J. Paine was chosen as the first president, and H. F. Hawkes, as treasurer.

The Eastern Expanded Metal Company was incorporated in 1894, with capital of $15,000, and located at 10 Franklin Street, where as the New England licensee of patents on expanded metal it built up a large business, and where also it began the manufacture of expanded metal lathing, partitions, elevator shafts, floors, and outside walls.

THE L. E. KNOTT APPARATUS COMPANY

In June, 1895, Messrs. Louie E. Knott and Eleazer Cate formed the L. E. Knott Apparatus Company for the purpose of equipping laboratories for science teaching, devoting their attention almost entirely to high schools, colleges, and medical schools. Prior to that date Mr. Knott had been associated with the Franklin Laboratory Supply Company in a similar line of business, while Mr. Cate had been teaching science in high schools for about seven years.

In 1899 the company purchased the educational business of the long-established E. S. Ritchie Company of Brookline, and three years later the corporation acquired the business and good-will of the Franklin Laboratory Supply Company.

In 1908 the Knott enterprise bought the business of the Arthur W. Hall Company, of Boston, the latter concern being the direct descendant of the Ziegler Electrical Supply Company.

In 1917 one of the company's employees evolved a plan to eliminate the menace of the German submarine. This was offered by the Knott Apparatus Company to the United States Government without expense to the Nation. In August, 1917, the Cambridge concern was informed that 100,000 devices were desired by the Federal Government and that the Cambridge concern must undertake to build them. Because of lack of facilities in the company's plant, it became necessary to practically abandon the regular line of business, but the work was undertaken, and at a great loss to the concern.

While this undertaking was completed in September, 1918, and the barrage of mines across the North Sea, using the company's mechanism, had been completed sufficiently to cause consternation in the German Navy headquarters, the concern was unable to secure the required order to remove the special Government equipment which had been installed, until the following March, which resulted in severely handicapping it in its regular line of production.

Most of the energy of the officials since that date has been employed in attempting to regain the ground lost during the practically two years when the concern was forced to abandon most of its regular business.

In 1908 Mr. Knott retired from the business in order to give his entire attention to personal affairs.

Eleazer Cate is president, Arthur W. Hall, treasurer, and Warren L. Maxcy, secretary of the corporation, which has capital of $90,000, and employs seventy-five operatives.

THE A. W. BANISTER COMPANY

The late A. W. Banister began business at 421 Dorchester Avenue, South Boston, in 1896, and the A. W. Banister Company was incorporated in 1911.

Upon the death of the founder in 1914, A. G. Prescott became treasurer and manager of the concern, which removed to a larger factory at 66 Hamilton Street, Cambridge.

Mr. Banister recognized that the perfect automatic stoking of boiler furnaces where shavings and sawdust are used for fuel, preventing a considerable loss of efficiency in burning the fuel and eliminating the smoke nuisance had long been a pressing need and he evolved what has come to be universally known as the Banister System for the handling of shavings, sawdust, emery and leather dust, wool, cotton, soap chips, kindling wood, and grain. While manufacturing and installing blown and dust collecting systems in many kinds of plants it has placed on the market within recent years, for use in woodworking plants, an automatic feeder system which will maintain constant steam pressure at a greatly increased boiler efficiency. The saving of one fireman pays for the installation in a very short time.

One plant equipped with this system has been in operation several years with practically no attention.

Many kinds of loose materials and industrial dusts are now handled by the system. The company also produces galvanized sheet iron commodities on a large scale.

The corporation has capital of $50,000 and employs thirty operatives. E. J. Banister is president, John H. Rogers, secretary, and A. G. Prescott, treasurer.

H. D. FOSS & COMPANY

In 1897 Herbert D. Foss and Charles D. Rice, formed the firm of H. D. Foss & Company which was incorporated in 1901, with capital of $24,000, and at 236 State Street, Boston, began the manufacture of "Quality" and "Premiere" chocolates, with about 4,000 square feet of space, a limited corps of employees, and meagre capital. Two removals to larger quarters were made, in Boston, and, in 1912, the corporation was reorganized with authorized capital of $600,000, of which $450,000 was issued, and later the entire amount was paid in.

In 1921 the company removed to Cambridge, having in the meantime purchased the business of the Boston Confectionery Company. Today the concern not only manufactures all of its confections, but produces its own paper boxes and does its own printing, and has added the Cynthia Sweets Company to its business.

For more than thirty years the concern has been in the hands and under the management of the original partners who own all of the common stock of the corporation, which now amounts to $888,400. Upwards of 500 operatives are employed and the enterprise ranks as one of the city's leading industries.

H. D. Foss is president, Arthur P. Stone, secretary, and Charles D. Rice, treasurer.

THE MURRAY PRINTING COMPANY

Two men, a boy and two job presses—one of the two men being Albert N. Murray, constituted the personnel and the equipment of the Murray & Emery Company, which began commercial printing in a small Union Street office, in 1898, and which removed to Bromfield Street a few months later, where rooms were rented in return for printing. A year later the headquarters were moved to Milk Street, and the first cylinder press was installed. Next the concern jumped to larger quarters on Oliver Street, where the increase in business warranted the purchase of five cylinder presses. Removing to Atlantic Avenue the company remained there ten years, employed forty operatives, and used a battery of seven cylinder presses.

In 1913 a site was purchased at Kendall Square, where was erected its own building designed especially to meet the growing requirements—a four story structure of the most modern type. Five years later Mr. Murray purchased the interests of Mr. Emery, and The Murray Printing Company was formed.

The Cambridge plant houses a large composing room which includes monotype, linotype and linoplate departments (the last, one of the more recent developments in the printing industry), nine job presses, twelve cylinder presses, a complete bindery and a storage vault with a capacity of nearly seven thousand boxes of plates.

For many years the concern has specialized in the printing of regular publications, including magazines, house organs, trade journals, stock lists, as well as books for Boston and New York publishing houses, and text books for schools and colleges.

In the production of catalogues, booklets, and all advertising matter for business in general, it is not only the company's mechanical facili-

ties but its experience and knowledge of the requirements of such work that enable it to serve customers. The actual printing is the least of the many problems connected with this class of work. The preparation of copy, the layout, the illustrating, the selection of type and paper, the cover design—all these details are cared for by the concern.

The company is a creator, as well as a printer, of anything connected with direct advertising. It employs artists and copy-writers, and edits several house organs.

Associated with Mr. Murray, who is treasurer of the company, are Charles H. Lowe and Hubert C. Shedd, who, with Mr. Murray, J. Stewart Jenkins and Arthur P. Murray, comprise the board of directors.

There is slight resemblance between the company's present plant and the little room of thirty-two years ago, and yet something has survived the years. The only piece of equipment remaining from the original plant is the font of figures which the concern still uses each year in printing its calendar. But, in addition, Mr. Murray and the boy who once comprised two-thirds of the staff are still active—the latter now a man, of course.

Albert N. Murray is president and treasurer. The corporation has capital of $88,000, and employs upwards of 100 operatives.

THE STORY OF LEVER BROTHERS COMPANY

Lever Brothers Company, manufacturers of Lux, Lifebuoy, Rinso and Lux Toilet Soap is the successor to the old Curtis Davis Company, whose control was taken over, in 1898, by the then William Lever, who later became Lord Leverhulme.

There were about eighty employees when Lever Brothers first started making soap in Cambridge. Today, in the office and works alone there are well over 1,000 workers, and the sales staff, which covers the entire United States, brings this total to more than 1,400—and all this in a little more than a quarter of a century.

With the appointment, in 1913, of Francis A. Countway as president, intensive campaigns of nation-wide publicity were undertaken, with the result that frequent additions to the works and office have been made, until today the company is one of the largest and most successful soap units in the United States.

In the manufacture of its products nothing is left to chance. Ingredients are not purchased haphazardly from any source, but, through its affiliation with Lever Brothers, Limited and their associated companies, the company goes directly to the place of origin for most of its raw materials, such as cocoanut oil, palm oil, and palm kernel oil, and has facilities unsurpassed for securing these commodities, since the Lever organization is indisputably the largest soap firm in the world.

Twenty thousand acres in the Solomon Islands, owned by the Lever interests, are given over to the cultivation of cocoanut palms. Here the cocoanuts are harvested, split, dried, and the dried meat, or copra, shipped to the nearest Lever oil mill for the pressing process, which yields the cocoanut oil. In the Philippines, another Lever Company,—the Philippine Refining Company, at Manilla and Opon,—is engaged in the same industry.

In far-off Africa one finds convincing evidence of the magnitude of the Lever Company, one unit alone owning an immense territory of nine million acres, together with several ocean-going steamers, more than fifty river steamboats, one hundred barges, and other river craft. It also man-



WHERE THE PRESENT LEVER BROTHERS COMPANY
BEGAN BUSINESS



PRESENT PLANT OF LEVER BROTHERS, CAMBRIDGE

ages more than two hundred and fifty trading stores and stations. Seven towns were built in West Africa by the late Lord Leverhulme, who established and maintained a splendid reputation for humane and fair dealing with the natives.

The main industry of the Lever Companies in West Africa, the growth and cultivation of millions of acres of oil palms, represents a tremendous investment in time, hard work, and money, for the jungle had to be conquered, the battle for health and sanitation fought and won, and several years had to elapse before the palm trees were old enough to yield the palm oil they now produce.

These were some of the problems faced and overcome by that hardy commercial pioneer, the late Lord Leverhulme.

Away down in the Antarctic Circle, the Lever whaling fleets, consisting of the best types of boats and equipment, seek the whale for his valuable oils and fat—thus carrying out the Lever policy of going to the source for raw materials, wherever possible.

Lever products are found the world over, and that is easy to understand when one considers there are Lever factories—more than 200 in all—in the United States, Canada, England, Belgium, France, Holland, Sweden, Denmark, Switzerland, South Africa, West Africa, India, China, Australia, and many other countries.

The plant of the parent company at Port Sunlight, England, is an immense establishment covering an area of about seven hundred acres, of which about half is occupied by the great factory and the remaining half by the model village of Port Sunlight, which Lord Leverhulme built in order to provide comfortable homes for the workers, of whom there are now more than 8,000.

Port Sunlight, one of the first experiments in community housing, has been a success where others have failed. Disorder is unknown and police are unnecessary. Every facility is afforded for recreation, education, and advancement. Here one finds the Lady Lever art gallery, valued, with its contents, at over $10,000,000 and attracting visitors from all parts of the world.

The Cambridge plant, in construction and equipment, is the last word in engineering and scientific planning. Here, the most improved machinery is used in all operations which lend themselves to mechanical handling.

There is a splendidly equipped laboratory, employing the best technical skill in testing raw materials and in checking up and supervising production all along the line to insure perfection in the finished product.

Distribution to the trade is accomplished through ten sales divisions and twenty-one warehouses located in the principal cities of the United States.

Under President Countway's leadership, constant enlargements to the plant have been necessary to keep pace with the rapid growth of the business. The factory attracts many visitors, and frequently groups from Harvard, Technology, Radcliffe, and the high and technical schools around Boston are shown through the works and offices.

Many years ago it was affirmed that the consumption of soap indicates the degree of civilization that a nation has attained, and judging from the progress of the Lever Brothers Company, it might just as truly be asserted that the consumption of soap is an unerring guide to the prosperity of America, for it is axiomatic that the more money people earn, the more clothing they have to launder.

The corporation has authorized capital of $25,000,000, and is New England's largest national advertiser of manufactured commodities.

Francis A. Countway is president, F. S. Davis, secretary, A. C. Roche, treasurer, and Russell White, general manager, and upwards 1,300 operatives are employed at the Cambridge plant.

THE LALLY COLUMN COMPANY

The Lally Column Company was formed in 1898 to manufacture the Lally Patent Columns, invented by John Lally, at that time a contracting mason, in Waltham. The business grew to such an extent that a few years later Mr. Lally gave up the contracting business and devoted his entire time to the manufacture and marketing of his columns.

The first factory was located at Beaver Brook, in Waltham, but in 1906 this was outgrown and a new plant, located at Erie and Albany streets, Cambridge, was erected. Later a factory was opened in Brooklyn, N. Y., and a company was formed in Chicago to manufacture the Lally products.

In 1898 three hundred house columns 3½ by 4 inches which sold for $900 constituted the total annual business. Since then the product has been greatly perfected and the company now manufactures Lally Columns as large as 12¾ inches in diameter, which are used in buildings up to about ten stories in height. The sales in the three plants for 1928 were approximately $1,500,000. Upon the death of the founder, in 1928, his

oldest son, John Lally, succeeded him as president of the Lally Column Company, which operates the Cambridge and Brooklyn, N. Y., factories. He is also president of the Lally Column Company of Chicago, which operates a plant in that city.

The Lally Column Company of Cambridge has capital of $200,000 and employs upwards of 100 operatives. John Lally is president, J. A. Henley is treasurer and secretary and Grosvenor Calkins, is clerk, of the corporation.

THE COLUMBIA JEWELRY COMPANY

Messrs. Frank E. and John J. Viano, brothers, with Anthony and Felix Viano, their uncle and cousin, respectively, formed a partnership in 1898, under the name of the Columbia Jewelry Company and began the manufacture of jewelry novelties on Medford Street, Boston. In April, 1900, they purchased land on Camp and Fair Oaks streets, in North Cambridge, and erected a one-story plant, to which additions were made in 1904 and in 1905, while an annex was recently built.

In 1909 the enterprise was incorporated, with capital of $52,000, and upwards of seventy-five operatives were employed. The company's New York office is at 246 Fifth Avenue.

Frank E. Viano is president and treasurer, and Ralph F. Orde, secretary.

THE J. P. EUSTIS MANUFACTURING COMPANY

The J. P. Eustis Manufacturing Company manufacturers of bathroom and lavatory accessories, under the trade name "The Brasscrafters," was founded in 1898 by John P. Eustis, who visualized with rare courage and persistent faith the coming of the bathroom with its furnishings in keeping with refinement and good taste.

In 1901 the company was incorporated under the laws of Maine, with authorized capital of $20,600.

The building at 92 North Street, Boston, housed the factory for some years. In 1910, when that structure proved to be inadequate for manufacturing the extensive line which eventually was developed, the factory and offices were moved to the building erected for the company at 12-14-16 Ames Street, Cambridge, where three floors, with approximately 30,000 square feet of floor space, are occupied.

In 1917 the company was reincorporated under the laws of Massachusetts, with authorized capital of $103,000.

The present officers are Charles F. Crandon, president, Thomas M. Keefe, treasurer, and F. Adele Coan, assistant treasurer, who also comprise the board of directors. The company employes fifty operatives.

THE BLANCHARD MACHINE COMPANY

In 1899, The Blanchard Machine Company was incorporated, and began contract machine work in a factory, located on Harcourt Street, Boston.

Five years later the plant was destroyed by fire, and a Cambridge location was purchased, and a plant was erected at 64 State Street, the company occupying the first floor and basement, containing about 13,000 square feet.

By 1909 the development of the Blanchard surface grinder was well under way, and a few years later this machine became the chief business of the concern.

The plant has grown until now the floor area exceeds 50,000 square feet, all of which is devoted to the building of grinders except a small area for the manufacture of grinding wheels for the machines.

For many years the company was managed by Winslow Blanchard, a graduate of Massachusetts Institute of Technology, in the class of 1888, and the growth of the business was largely due to his ability and foresight. He was president of the company until his death in 1923. Henry K. Spencer, also a graduate of M. I. T., in the class of 1909, who has been connected with the company since that year, took over the management following Mr. Blanchard's death. The present officers are: Thomas H. Shepard, president; O. Atherton Shepard, treasurer; Henry K. Spencer, secretary and manager. Winfield W. Blakeman is superintendent.

The Blanchard Machine Company is the only machine tool manufacturer in Cambridge, and its grinders are extensively used in the metal working industries of the United States, and also in twelve foreign countries. They have contributed their share toward the increased production and reduced cost that have brought so many mechanical inventions within the reach of all.

They are employed in machining flat surfaces on the parts of all kinds of machinery and tools. Many parts can be finished from the rough in one operation by these devices.

They are produced in three sizes, and also in an automatic type for quantity production, and as they are adaptable to a wide variety of prices, they are profitable in small shops as well as in large factories. The corportion has capital of $150,000 and employs upwards of 150 skilled mechanics.

In May, 1929, there was completed and occupied a new erecting shop, which adjoins the company's other buildings, and which provides complete facilities for the erection and testing of surface grinders. The structure is 100 by 90 feet, with a gallery along one side, thirty feet in width, the remaining area of approximately sixty feet being spanned by a fifteen-ton crane.

T. H. Shepard is president, O. A. Shepard, treasurer and Henry K. Spencer, manager and secretary.

THE A. F. ROBINSON BOILER WORKS

Upwards of fifty operatives are employed at the plant of the A. F. Robinson Boiler Works, which concern has long specialized in the building of tanks of all types and capacities, which are mounted to meet the requirements of owners.

The concern has a completely equipped welding department in which this modern means of repairing is extensively used in the reclaiming of broken parts of trucks at a small fraction of the cost of replacing with a new part and as the work is done immediately, it prevents the non-use of the truck sometimes made necessary while awaiting the arrival of a replacement. Smoke stack work, the making of boiler breechings and the building of truck bodies are also specialties of this concern.

John A. Jefferson is president, and Fred B. Wheeler, is treasurer, of the corporation, which employs fifty operatives.

THE HINMAN ASBESTOS CORPORATION

The Hinman Asbestos Corporation maintains its principal plant, on Harvard Street, with branches in Springfield and Worcester, and while there are many devices designed to reduce fuel costs on the market, the

use of asbestos constitutes a notable exception to the general rule, as most of the products require the installation of entirely new fixtures or other expensive outlay. Scientific figures indicate that when properly applied the economies effected by the use of asbestos range from twenty to thirty-three and one third per cent.

THE CAMBRIDGE PAPER BOX COMPANY

In 1900, the Cambridge Paper Box Company was established, and was incorporated the following year, with capital of $20,000. It acquired 30,000 square feet of land, and the idle wooden factory of a defunct company. When fire destroyed the plant, in 1904, leaving nothing save a part of the machinery, a three story brick factory, with basement, was erected, containing 24,000 square feet of space, and in 1912, an addition of the same size was made, thus doubling the capacity, while the company took over a wooden building for storage. Four years later, a three story and basement building, of brick, was erected, which added 20,000 feet, giving the concern a total floor area for manufacturing and storage, of 85,000 square feet, in Cambridge.

In 1920, the company built an auxiliary plant, in Woburn, two stories high, 160 by 50 feet, and five years later it acquired the business and machinery of two consumer plants, a small paper box unit and a paper can and mailing tube factory, and that year added two more stories to the Woburn unit, in order to accommodate the additional machinery acquired through these purchases.

Ernest R. Spaulding served as president of the corporation, for twenty-six years, retiring on February 14, 1929. His service with the concern was exceeded in years by that of Joseph H. Perry, the present president, by three years, Mr. Perry having been the founder of the company and having been treasurer from the beginning.

Twenty-six officers and employees have served the concern for periods of from fifteen to twenty-nine years.

The company has capital of $85,000 and employs 250 operatives in its two factories.

THE WARREN BROTHERS COMPANY

At the beginning of the present century, when the automobile was in its infancy and the good roads movement had not been conceived, the late Fred J. Warren conceived, designed, patented, produced and laid the first bitulithic pavement ever used on a highway in the world, one of the original installations being made on Temple Street, Cambridge, which, at that period, was one of seven cities in the United States that had a roadbed of this type. In 1901, there were only 16,000 yards of this type of pavement in existence in this country. The Warren Brothers Company created and built the asphalt paving machinery essential to economical installation of the bitulithic product, and today the concern is capitalized for $4,694,280, employs thousands of men in executing its contracts throughout this country and abroad, and has laid more than 135,000,000 square yards of Warrenite bitulithic pavements in upwards of one thousand cities, counties and states, as well as in Canada, England, Australia, Chile, China, Japan, Cuba, Argentine, Spain and other foreign countries. This total is equivalent to approximately 8,000 miles of highways.

It is no uncommon occurrence to simultaneously carefully supervise the construction of roads in 250 cities of the United States by daily laboratory tests at the Kendall Square plant of the company, where each day

samples of the Warrenite product are received and analyzed in the laboratory. These samples are torn apart, the asphalt extracted from the mineral matter, and each ingredient is tested to see whether it conforms to the correct formula. Any deviation from the formula results in telegraphic advice to the engineer in charge of construction that he may immediately correct the fault.

And so it may be asserted figuratively, and in thousands of instances literally, that all roads lead to Kendall Square because they are directly connected with paving plants made there.

Here again is incontestable proof that the oft-repeated statement that no new manufacturing idea has been conceived or developed in Massachusetts for two generations is not in harmony with the facts.

The invention of bitulithic pavement, followed by the designing and construction of the machinery to efficiently install it is without parallel in the field of good road building in this or any other country of the world, and Fred J. Warren's place in history is secure.

The Warren Brothers Company is a twentieth century development, and one of the most conspicuous examples of what Massachusetts brains, capital and inventive genius can produce.

Formed in 1900 by the seven sons of Herbert M. Warren it has shown a constant increase in the magnitude of its operations year after year.

Fred J., Henry and Herbert Warren had been reared in the atmosphere of the asphalt paving industry, having been connected with the Barber Asphalt Paving Company, of which corporation their father, E. B. Warren was one of the founders, while the others, Messrs. George C., Walter B., and Ralph L. Warren were identified with the Warren-Scharf Asphalt Paving Company at the time the new concern was formed, and Albert Warren, the seventh brother, although engaged in another line, has been in constant touch with the paving industry. The Warren-Scharf Asphalt Paving Company was formed by Messrs. Cyrus, Herbert, John and Samuel Warren, brothers of E. B. Warren, and at the time of the so-called asphalt trust, in 1899, the concern was the second largest sheet asphalt company in this country.

The fathers and uncles of the seven Warren brothers had owned and operated refineries for the manufacture of coal tar and asphaltic products for a period of over fifty years dating back as far as 1847, and were the first to apply coal tar and asphalt to most of their uses, such as roofing, waterproofing and paving, as well as the first importers of Trinidad asphalt into this country. One of the elder Warrens, in later years, on account of his practical experience in this line of work, held the chair of organic chemistry at the Massachusetts Institute of Technology, where he conducted important original research work in the field of hydro-carbons, was a graduate of Harvard University and had received an honorary degree there and had done extensive graduate work in Heidelberg, Freidberg, Munich, Berlin and London. Others of the elder Warrens had taken scientific courses at Harvard and elsewhere.

The first year's work of Warren Brothers Company, aside from opening executive offices in Boston and erecting a paving plant on the site of the present Kendall Square factory, was the laying of a sample area of bitulithic pavement in Cambridge. In 1901-2 pavements were installed in Boston and Pawtucket. Today the company is the largest of its kind in the world, manufacturing eight types of road-making plants, with a factory of one hundred thousand square feet of floor space, and building forty per cent of all the paving plants in the world.

Until the invention of bitulithic, the well-known asphalt pavement was the standard smooth-surface pavement for city streets. Mr. Warren, by using stone of various gradings, from one and one quarter inch down to dust as fine as talcum powder, and enough of each size to cause all the particles to interlock, produced a more stable pavement, and one which proved sufficient for the traffic requirements of that time.

However, this pavement was not infallible under all conditions, and as traffic requirements were becoming more and more severe the company never ceased research and experimentation in an effort to improve upon the original product. In 1910, E. C. Wallace, at that time in charge of bituminous materials for the company, invented a pavement under the name Warrenite-Bitulithic. This invention was based on the use of a well-graded coarse stone mixture, which is spread on the foundation to approximately the desired depth of the completed pavement, over which is spread a fine aggregate bituminous mixture composed of crushed screenings and sand mixed with asphaltic cement, the two compressed together, producing a blend totally different from all other bituminous structures.

By this method it became possible to use the proper quantity of each sized stone in the lower portion to give stability to the structure, and, in addition, to use a very soft, plastic surface mixture which would be waterproof and which would protect the stones of the coarser mixture from the abrasion and shattering effect of heavy traffic. In sheet asphalt pavement there is a very definite line of demarcation between the two layers, but in Warrenite-Bitulithic the two mixtures blend together so as to produce in the completed pavement a one-layer structure, rigid and stable in the lower portion, but very plastic at the surface giving it the ability to reseal itself under traffic in case there is any break in the fine surfacing mixture.

Warrenite-Bitulithic was first laid on Cove Street, New Bedford, in 1910.

It was early found that no paving plant on the market would satisfactorily separate the ingredients and recombine them in the proper proportions, consequently, since its formation, the company has built its own paving plants. These are manufactured for its own use and are for sale to cities and other organizations all over the world.

For the construction of Warrenite-Bitulithic alone there are four types of plant: "Permanent," built for erection on a permanent site, "Railroad," erected on a flat car chassis and designed to operate in that position, "Semi-Portable," designed for dismantling and erection as desired, and "Portable Road," for ready transportation. The principle of operation is the same in all four plants.

Although the company's pavements meet all demands, research is continuously in progress at the company's laboratory tending towards improved types of road material.

It has broadened its activities to construction fields other than paving and a portion of its business is now of a class which, while pertaining to paving contracts, is not reflected by statistical statements of the area of paving work secured.

Perhaps the best criterion of the merits of the company's bitulithic paving product rests in the fact that hundreds of cities have continued year after year to award contracts to the Cambridge concern. Included in this list are Boston, Cambridge, Somerville, Fall River, New Bedford, and Brookline, in this state.

In 1928 the aggregate volume of business executed by the company

and its licensees was larger than ever before, and exclusive of its work in Cuba the contracts secured that year aggregated 8,209,000 square yards. The award of the contract for the great Cuban Central Highway was an outstanding tribute to the Cambridge enterprise. The thoroughfare extends practically from one end to the other of the island, and when completed will be about 700 miles in length, of which total approximately 500 miles will be of Warren-Bitulithic pavement. This is believed to be the largest single public works contract ever awarded.

In Cuba, completed pavement was laid during 1928 to the extent of 1,369,000 square yards, as compared with the initial construction of 40,000 square yards in 1927.

During 1928 the Cambridge company investigated paving conditions in several foreign countries in which it had not heretofore operated and where no contracts have yet been secured but which are as yet undetermined.

The same year, in addition to the repair parts and miscellaneous equipment, the company manufactured sixteen new paving plants, of which ten were sold in foreign countries and six in the United States. The value of the product of this division during 1928 aggregated approximately $558,000.

The same year the parent concern secured a substantial interest in the Pan Pacific Piling & Construction Company, a Delaware corporation, which is the successor to a company of a similar name, operating on the Pacific Coast.

Through one of the corporations in which Warren Brothers Company is interested it performed contracts aggregating $123,643 in connection with the Mississippi flood relief work, during 1928.

Two subsidiary companies—Australian Roads, Sydney, Australia, and Victoria Roads, Ltd., Melbourne, Australia, are continuing to secure business in these cities and their immediate suburbs, while another subsidiary —Warren Brothers Company of Argentina—was awarded additional contracts in 1928 aggregating 300,453 square yards.

The work carried over in Cuba for construction in 1929 and future years is approximately 4,591,000 square yards. It is expected from the progress already made that the entire present contract there will be completed by the end of 1930, more than a year earlier than was originally contemplated.

There is a large demand for additional highway and municipal work in Cuba, a considerable portion of which the company will undoubtedly secure, and there are excellent prospects for a large and continuous business in Spain.

During 1928, the company received an award of a contract in the City of Santiago, Cuba, aggregating 358,000 square yards of Warrenite-Bitulithic pavement, and an additional contract for paving a highway from Talcahuano to Concepcion, Chile, aggregating 61,939 square yards of the same type of pavement.

In 1929 the Trwale Drogi, S. A., the newly organized Warren Brothers Company in Poland, was awarded an initial paving contract for 40,000 square meters.

In carrying on the development of its foreign and domestic business, it became evident that considerable attractive business both domestic and foreign could be secured on a safe basis if the Warren Brothers Company were in a better position to extend reasonable terms of credit for payment of the work. With this in view, the Warren Brothers Finance Com-

pany, under laws of Delaware, with authorized capital of 500,000 shares of no par value common stock, was formed, in 1929, in which the parent company acquired substantial financial and managerial interests.

Until 1926 the executive offices and headquarters of the company were located in Boston, but that year they were removed to the modern office building erected at 38 Charles River Road, Cambridge.

The paving plant borders the Broad Canal, in Cambridge, and has been located at 32 Potter Street, East Cambridge, since the company began business in 1900. Additional land area has been acquired from time to time, to care for the development of the company's complete manufacturing division which specializes in the building of paving plants and in the production of kindred paving equipment.

Offices are now maintained in most of the principal cities of the United States and Canada, as well as in Sydney and Melbourne, Australia; Tokio, Japan; Santiago, Chile; Buenos Aires, Argentina; Havana, Cuba; Valencia, Spain; and Warsaw, Poland.

In 1925, the company was granted a patent for a rubber-covered cement-paving block.

The company's exhaustive tests in connection with the development of this new product indicate its superiority to anything heretofore produced in this line, but it is difficult to estimate its possibilities because thus far the use of any form of rubber pavement has been limited to a comparatively few cities, notably Paris.

John Dearborn is president, H. M. Warren, secretary, and E. Sutcliffe, treasurer, of the Warren Brothers Company, which employs thousands of skilled and unskilled men in its operations. The corporation has capital of $9,939,733.

THE NATIONAL CASKET COMPANY

For upwards of three quarters of a century Cambridge has been the center of casket manufacture, for it was in 1854 that D. and Wm. L. Lockhart began the production of coffins, caskets, and undertakers' supplies, on Bridge Street, near Prison Point, with capital of $300. Four years later, W. L. Lockhart became the sole owner, and in 1860 the factory was destroyed by fire, but was immediately rebuilt.

On January 1, 1893, a partnership was formed by Charles H. and William L. Lockhart and George M. Howard, under the name of William L. Lockhart & Company which grew during the decade to be the largest establishment of its kind in New England. Warehouses were maintained in Boston, and 125 hands were employed.

In August, 1900 the Hamilton, Lemmon, Arnold Company of Pittsburg, Pa., the Chappel, Chase, Maxwell Company, of Oneida, N. Y., with branches in Syracuse and New York City and the Stein Manufacturing Company, of Rochester, N. Y., with branches in New York City, Chicago, and Boston, all three old established enterprises, were amalgamated into the National Casket Company, and within a year thereafter the Boston Casket Company of Boston, the Maryland Burial Case Company, of Baltimore, and the D. E. Case Company, of Albany, N. Y., were acquired.

A sales branch was established in Philadelphia, in 1897, and two years later the capital stock was increased to $6,000,000. The business of the New Haven Casket Company, of New Haven, Conn., was purchased in 1899, and plants of the National Casket Company were established the same year in Nashville, Tenn., Louisville, Ky., Indianapolis, Ind., and Chicago, Illinois.

In 1906, the business and assets of W. L. Lockhart & Company, of Cambridge, were bought, and this acquisition brought to the National Casket Company one of the largest and most modern plants in the industry.

Today, the corporation maintains sales branches in twenty-eight of the leading cities of the United States, covering the territory between the Atlantic Seaboard and the Rocky Mountains. In conjunction with these offices are fifteen factories engaged in the manufacture of various types of wood and metal caskets, dimension lumber, hardware, dry goods, including men's suits and women's dresses, and various other adjuncts to the funeral director's equipment.

In May, 1927, the company first occupied the magnificent Ames residence, at the corner of Commonwealth and Massachusetts avenues, Boston, where the executive offices and display rooms have since been located. The president and general manager of the corporation, P. B. Heintz, who was the owner of the Boston Casket Company prior to its absorption by the National Casket Company, has been associated with the two concerns for more than fifty years.

P. B. Heintz is president, H. L. Stein is secretary, and W. E. Carnahan, treasurer of the corporation, which ranks as not only the largest enterprise of its kind in the United States, but which typifies the ability of Massachusetts industrialists to create, foster and maintain in the twentieth century a corporation whose ramifications as its name implies are nation-wide.

Two hundred operatives are employed at the Cambridge plant.

CATERING TO THE SWEET TOOTH OF THE WORLD

It was not until 1901 that three of the leading confectionery firms—Chase and Company, Bird, Wright & Company, and Forbes, Hayward & Company came together under the corporate name of the New England Confectionery Company, and under the trade mark name of Necco the concern has grown during the intervening quarter of a century to a position of leadership in the confectionery trade of the nation, especially in the field of popularly-priced sweets. Manufacturing as it does over 500 kinds of confections, the enormous business developed by the corporation is directly responsible for the building on Massachusetts Avenue, Landsdowne, Cross and Albany streets, in Cambridge, of the world's largest candy factory, six stories in height, of reinforced concrete and limestone, where the 1,300 hands employed by the concern are located.

Oliver Chase, whom the International Encyclopedia states was the inventor of the first candy machine in the United States, when he designed and developed the lozenge cutter, was the founder of Chase & Company.

Mr. Chase's conception of mass production undoubtedly was actuated by his own physical limitations. Picture, if you can, a one-man manufacturing plant, in a little shop, on a side street of Boston, in the year 1847. At the time of his invention the only tool for cutting lozenges was a hollow conical tube open at both ends and sharpened to a knife edge at the smaller opening. The operation consisted of stamping out of a sheet of cold sugar paste the famous Chase lozenges, which are now sold from coast to coast. As they disappeared through the smaller end of the cone they became loosened and were shaken out of the larger end when the cone was filled, and were then placed on a board to dry. Chase's machine operated to a far greater capacity than was possible by hand and gave him more opportunity to devote his time to the selling of his increased production and at the same time kept his labor expense at a minimum.

In building its new factory in Cambridge the New England Confectionery Company adhered closely to the policy early adopted by Chase, but, of course, on a greatly magnified scale. Every conceivable labor-saving device has been adopted that guarantees the same high standards of product and reduces the cost to the consumer. Today, the tremendous output of the plant has so expanded throughout the United States that it is shipped in carload lots as a sequence of aggressive sales and advertising efforts.

Over 500 varieties of confections constitute the products of the New England Confectionery Company and in recent years the convenient pocket package has opened a large market. Necco was quick to seize this opportunity and today it manufactures more than fifty five-cent candies, in convenient packages, and through aggressive sales and advertising effort, its branded lines have grown tremendously.



NEW ENGLAND CONFECTIONERY COMPANY, CAMBRIDGE

The largest plant of its kind in the world, devoted exclusively to the production of confectionery

There is probably no industry in Massachusetts subjected to such rapidly changing whims and fancies of the public as that which is predicated upon the human sense of taste.

Novelty candies are constantly in demand as public favor swings rapidly from one style of taste to another. New names, new wrappers, new color designs and decorations in packages as well as devices for counter and window display all contribute in a tremendous degree to the success of an advertising expenditure.

The company has attained its position as the largest New England producer of confections by sensing the popular trend in candy style and taste; by presenting new goods of the highest quality and choicest materials that carry an appeal to the consumer; by employing colorful and distinctive wrappings and packages; by adopting intensive methods of distribution, and of engaging in advertising of a unique character.

The value of the products of this concern plays an important part in helping Cambridge reach and maintain the position of fifth largest producer of confectionery in the United States.

The corporation has capital of $2,000,000 and it employs upwards of 1,400 operatives. Fred R. Hayward is president, Horace S. Ridley, first vice president, Harry C. Achorn, second vice president, and J. Karl Mason, treasurer. They, with George B. Farrington, Edwin F. Forbes, and Frank E. Clark constitute the board of directors.

THE DOTEN DUNTON DESK COMPANY

For twenty-eight years the Doten-Dunton Desk Company has been manufacturing high grade office furniture for banks, insurance companies, public service institutions and executive offices of commercial concerns, its products being distributed by dealers in all of the principal cities throughout the country and abroad, except in New England, where it is marketed by its own retail organization. When the company was established in 1902 and began manufacturing desks at its present location it employed six cabinet workers.

The business was founded on an idea. In April, 1902, Kervin R. Dunton, then occupying a prominent position with a large manufacturing concern, found that his experience had been that many manufacturers planned to produce as cheaply as possible and without regard to individuality of product. Realizing that there were many business men who preferred distinctive office furniture, if such were obtainable, Mr. Dunton felt that if some one would turn out such an article a market for it could be developed.

As a result of his confidence in this belief, Mr. Dunton founded the Doten-Dunton Desk Company, and his first efforts were devoted to turning out a product similar to the general idea of office furniture existing at that time, with refinements and certain improvements. The growth was slow, but as time passed the product was improved both in design and workmanship.

At the outset, roll top, flat top, typewriter and the old type of bookkeepers' desks were the only items manufactured. The roll top with the high roll and hinged sides, fitted with a clock and calendar was then considered the last word in office desks. At that time 70 per cent of the product was manufactured of oak, but in 1905 mahogany came into use and proved popular. That year the company started manufacturing a low roll top desk, and the demand for chairs of quality in keeping with the desks prompted the concern to go into the manufacture of the former.

The Doten-Dunton Desk Company did not become well known until after the Baltimore fire of 1908. The Baltimore and Ohio Railroad was erecting a new building and desiring to purchase furniture, Mr. Dunton went to Baltimore, conferred with the officials, and it was then that what is now known as the sanitary base desk was developed. Previously, all desks were of full type pedestal construction, built to the floor and not provided with casters. From that time on Doten-Dunton desks were developed along sanitary lines. Built on legs, they presented an improved appearance over the old-fashioned type, and today this style is universally known and sought.

Since 1914 walnut has been increasingly popular and during the past few years 80 per cent of the product of the company has been furnished in that wood. Today the Doten-Dunton product is regarded as a standard of comparison in the office furniture field. Over 275 skilled workmen are now employed at the Cambridge plant, whose products are shipped to all parts of the world. Practically the entire production of the factory is of high-grade suit furniture and the fact that it is built in New Eng-

land is being used in the company's advertising. Suites of period designs are being named for New England towns in order to further identify the product with the New England reputation for the best skilled workmanship.

The corporation has capital of $125,000, and Kervin R. Dunton is president, Walter R. Washburn, vice president, R. Harrison Morgan, treasurer, and Ralph S. Russell, sales manager.

The company's Boston salesroom is at 32 Franklin Street.

Among the prominent installations of period office furniture made by the company have been the offices of the Provident Mutual Life Insurance Company of Philadelphia, the National Grocery Company, of Jersey City, the Ford Motor Company, of Fordson, Mich., the Continental Casualty Company, of Chicago, and the Marland Oil Company, of Ponca City, Okla.

THE MANSION HOUSE ICE CREAM COMPANY

Many years ago the old Mansion House, a famous East Cambridge hostelry, acquired an enviable reputation among its guests and habitues for the excellence of the ice cream it served on its menus, and in fact many connoisseurs resorted to the hotel for the sole purpose of partaking of this food product.

Connected with the cuisine was William P. Sutton, who at that period conducted a small grocery store on Bridge Street, Cambridge, and who made the cream served at the hotel, and also sold it at retail in his shop.

In 1902 Mr. Sutton began to devote all of his time to its manufacture, and in 1913 the Mansion House Ice Cream Company he formed ceased to operate as a retail enterprise, and began the wholesale distribution of the product. In May of the following year it occupied its present modern plant, erected on Second Street. In 1927, the company was merged with the General Ice Cream Company, and it now operates as the Mansion House division of the latter concern.

William P. Sutton is president and treasurer, and E. V. Sutton, secretary of the corporation, which has capital of $300,000, and which employs seventy-five operatives.

THE F. H. DOW COMPANY

In 1902, Fred H. Dow and Anton H. Rice organized the F. H. Dow Company and until 1920 the concern was located in Boston, removing in the latter year to a modern steel and concrete factory, in Cambridge, containing about 40,000 square feet of manufacturing space where upwards of 125 employees are engaged in the production of confectionery. Anton H. Rice is president, and Fred H. Dow, treasurer and clerk, of the corporation, which has capital of $95,000.

THE F. S. PAYNE COMPANY

In the month of April, 1903, F. S. Payne, who had long been engaged in the elevator industry, and had gained a wide experience in that field, began, in Boston, the repair and maintenance of elevators. Three years later he incorporated the business, under the laws of this Commonwealth, as the F. S. Payne Company, and in 1908 he manufactured the first of the elevators which have since made the concern famous.

Three years later the company's present plant was built in Cambridge, to which many additions have been made in order to care for increased business.

In March, 1916, Mr. Payne retired as an officer of the corporation,

and was succeeded by Frederick A. Smith, who became president and general manager.

Under his administration the concern has grown to be one of the leading industries of the city, and employs upwards of 250 operatives. Following the establishing of a branch plant in Boston, offices were located in Lowell, Providence, and New Haven, and in May, 1927, the corporation acquired the Central Iron Foundry, in Franklin, where all the grey iron and semi-steel casting required for the company's elevators are produced, and where also a large volume of these classes of castings is manufactured for customers.

The present output of the F. S. Payne Company includes a complete line of electric and hydraulic passenger and freight elevators; electric and hydraulic dumbwaiters, sidewalk elevators, and ash hoists. In addition, the concern manufactures for its own use, and for the elevator industry, elevator controllers, which it distributes throughout the United States and in foreign countries.

The evolution of the elevators during the last fifteen or twenty years has been marked, and no concern has played a more important part in providing improvements than the F. S. Payne Company.

The corporation has capital of $460,000, and employs 250 operatives. Frederick A. Smith is president, Edmund D. Codman is treasurer, Elmer A. Noden is secretary, and the above, with William S. Smith, the chief engineer, and Howard A. Gilson, manager of service, constitute the board of directors.

THE DIX LUMBER COMPANY

Ervin R. Dix established the Dix Lumber Company in 1913 as a supply yard for his construction business, but the enterprise gradually developed into a lumber and mason supply concern, and seven years later was incorporated, with capital of $15,000. It then employed three men and used one horse in effecting deliveries.

In the intervening twenty years its sales have risen to well over $1,000,000 a year, it employs upwards of eighty-five men, operates fourteen motor trucks, and has a plant covering an area of five and a half acres, a railroad siding supplying the yard and mill with service. It maintains a display room, operates a plan service department and a financing unit for the construction of new homes.

Ervin R. Dix is president, U. M. Carlton, secretary and treasurer of the corporation, which has capital of $300,000.

THE FLASH CHEMICAL COMPANY

As one reviews the events which led up to some American inventions, processes, and formulas he becomes impressed with the romantic side of industrial productivity, and perhaps as unusual and unique a set of facts is found in the genesis of the Flash Chemical Company as is observed in the inception of any present-day Cambridge industry.

The formation of this company resulted from the rather commonplace act of washing one's hands at the close of a hard day's work. One evening in 1906, Alfred E. Cleveland, who had long been connected with the soap industry, having risen from the ranks of the so-called missionary retail soap salesman to the district sales-managership of one of America's largest purveyors of soap products, and who had given considerable study to the problem of manufacturing a cleaner that could be used by mechanics and steel-mill workers particularly who had found it impossible to remove

the lodged-in dirt, grease and grime, proceeded to the sink to wash his hands before leaving for home. He had been engaged that day in carrying on experiments with textile soaps, and with a mixture that was a blend of several oils, he passed a barrel of pumice. The thought of a combination of oils and pumice as a possible base for a hand cleaner flashed through his mind, and putting his thoughts into action he found that the union of the materials quickly and thoroughy cleaned his hands. He was obsessed with the result of the experiment as he wended his way homeward, and hastily eating his dinner, he retired to his laboratory to indulge in further experiments, and he soon became convinced that he had discovered the formula of a hand cleanser different in nature and action than anything that had been discovered up to that time.

In less than a month thereafter a company was organized, with capital of $800, most of which was spent in advertising. A small shop was opened in June, 1906, at 97 Fulton Street, Boston, and by September of that year the concern was in receipt of so many orders for its product that Mr. Cleveland leased the entire building, at 9-10 Fulton Place.

The founder sought a short, live, snappy name for his product—one easy to remember and to advertise. While talking with a friend, during the progress of a thunderstorm that summer, he casually mentioned that he was searching for a good name for his hand cleaner. Just at that moment an unusually brilliant flash of lightning streaked across the sky. "There's your name—Flash," exclaimed his friend, and it was immediately adopted. The title is usually depicted with a streak of lightning across the letters.

In 1915 a four-story brick plant was erected on Main Street, in Kendall Square, but it was outgrown within two years after its completion, and in 1917 the company purchased its present factory, on Second Street, with sufficient adjoining land to permit extension.

The business, created at a time when the automotive industry was in its infancy, grew by leaps and bounds, and by 1920 upwards of 12,000,000 cans of the hand cleanser were produced and marketed. Branch offices are located in Chicago, New York, Pittsburg, Detroit, St. Louis, and San Francisco, and the company has representatives in many foreign countries.

The company has adopted many progressive ideas and methods in advertising and sales work. It operates a fleet of advertising cars scattered throughout the various manufacturing centers of the country.

Since the day Flash was produced, tests have continually been made, and experiments constantly conducted to safeguard the quality of this product and later of others bearing the Flash name. One department is constantly engaged in making tests of ingredients and of finished products, looking toward improvements in products and containers. This work is supplemented by reports from large users of Flash products.

In addition to the cleaner, the company makes many brands of similar types of hand soaps and cleaners, the majority being under private brand names for other distributors. Flash is different from the others, however —instead of being made of a soap base and abrasive material alone to do the cleaning, it is an oil cleaner, made of antiseptic and healing oils, glycerine and genuine Italian pumice. The small percentage of soap stock is used in Flash merely as a rinse.

The other products of the company are numerous and include Vegetol soap, an antiseptic type made of cocoanut oil, waterless soap, for use where water is not available, Cleanup soap paste, Cafo-Cear, an insecti-

cide, hardwater pumice soap, cream silver polish, cream metal polish and liquid soap. The latter is a product for which the company is becoming almost as famous as for its hand cleanser. An industrial department gives special attention to soap powders, cleaners and liquid soaps, and supplies a service to industries by investigating and solving their cleaning problems.

In less than a quarter of a century the original capital of $800 has grown to $100,000 and production has increased to more than a million cans of the principal commodity, to say nothing of the other items.

Fifty hands are employed.

Alfred E. Cleveland is president, Albert F. White, treasurer, and they, with Frank E. Cleveland and Joseph M. Lubit, constitute the board of directors.

THE C. A. BRIGGS COMPANY

From the wheelbarrow, trundled through the streets of the town of Cambridge a hundred years ago, by Robert Douglas, the pioneer candy maker of the locality, who made his sales in that manner, to the present-day local production of confectionery, is a contrast that is significant.

A little more than a quarter of a century ago, or to be exact, in 1901, Charles A. Briggs bought the lozenge business owned by R. H. Leach and established the C. A. Briggs Company, whose sales the first year amounted to about $6,000. Producing a wafer of superior quality, he introduced it to the trade as the Boston Wafer, and advertising it in newspapers and billboards soon built up a market that has never been lost.

The company soon outgrew its original quarters and in 1904 a six-story plant was erected by it, 70 by 70 feet, containing 52,000 square feet of manufacturing space, and here the Briggs confections—a varied line—have been produced for sixteen years.

The company designs and manufactures its own candy-making machinery, and many of the devices are of the complicated automatic type. One of the unique productions of the completely equipped machine shop maintained at the plant is a machine that receives an endless bar of molasses candy at one end and delivers it cut into kisses, wrapped in tissue paper, with the ends neatly twisted, at the other, and all at the rate of 9,500 per hour.

The concern employs about 275 operatives and C. A. Briggs, the founder, is both president and treasurer.

THE TAILBY-NASON COMPANY

The Tailby-Nason Company was incorporated under a Massachusetts charter, in 1905, to manufacture and deal in medicinal preparations, commonly known to the professions of pharmacy and medicine as pharmaceuticals. The line comprised several hundred compressed tablets of various formulae, elixirs, syrups, extracts and tinctures.

The business was established in the buildings at 155 Fulton and 180 Commercial streets, Boston, with offices in the latter structure, at the head of Commercial Wharf.

The romance of the sea was at the very front door of the new enterprise and the sparkling waters of the harbor were dotted with shipping from every port in the world. Inspiration for research and the development of ideas and new products was stimulated by the busy scenes visible from the windows of the laboratories.

The business grew and in 1910 was reorganized as the Tailby-Nason

Company of Maine and soon after was removed to larger and more commodious quarters at 364 Congress Street.

One of the big sales of the pioneer days of 1905 was a barrel of Emulsion of Cod Liver Oil to a progressive dealer. This was the beginning of a fair trade in cod liver oil products which were featured by the new firm. With the development of knowledge in regard to vitamins, in the early '20s, cod liver oil came into more generous use by the medical profession. The fishy taste of the oils offered at that time acted as a restraining influence to the popularity of the product. Following extensive research Tailby-Nason Company introduced, in 1924, Nason's Palatable Cod Liver Oil, a flavored pure oil, agreeable to the taste, which met with immediate approval.

In 1925 General Manager Nason sailed for Norway and established at Salhus, Nason & Company, a subsidiary corporation which manufactures and refines cod liver oil solely for the Tailby-Nason Company, of Boston. The purpose of the management was to control every process in the production of the oil, from the cod to the bottle.

The superior quality of the cod liver oil produced by Nason was recognized by physicians and in 1927 and 1928 additional extraction plants were established in the Lofoten Islands of Norway—the romantic land of the Midnight Sun—the world's greatest fishing grounds. The cod fishing season in the Lofoten Island waters is from early January to late April. Far north of the Arctic Circle, but warmed by the beneficent Gulf Stream, the waters do not freeze, although the temperature of the air is usually just below freezing. Fishing is close to the shore and the cod are drawn from the waters and the liver separated from the body in an atmosphere of cold storage. Within a few hours the livers, almost alive, are delivered at Nason & Company's extraction plant where the oil is extracted by the modern steam method which produces a light, palatable and highly potent product.

The commodity is shipped from the Lofoten plants to Salhus, in air-tight tin-lined barrels, where it is clarified and refined by a special filtration process which removes the stearin. From Salhus it is transported by steamer to Tailby-Nason Company, at Boston, where it is biologically tested and standardized, and made attractive to the taste by the addition of a dash of aromatic flavor before it is bottled.

In October, 1927, the Tailby-Nason Company began the erection of a new building at 49 Amherst Street, in the Kendall Square section of Cambridge. The cornerstone was laid by Dean Bradley of the Massachusetts College of Pharmacy and in recognition of the firm's most important product a bottle of Nason's Cod Liver Oil was placed in the stone with a copy of Dean Bradley's speech and a catalogue of the company's pharmaceutical products. Other celebrities present were Dr. Reid Hunt, Professor of Pharmacology at the Harvard Medical School; Director Frank E. Wing, of the Boston Dispensary; Congressman Fred W. Dallinger, of Cambridge; President Albert N. Murray, of the Cambridge Industrial Association, and a large number of the executives of neighboring firms in the Kendall Square district.

A recent notable achievement of the Tailby-Nason Company has been the equipping of the Byrd Expedition to the Antarctic with its medicinal supplies, including Nason's Cod Liver Oil. Commander Donald MacMillan has carried Tailby-Nason products on The Bowdoin on all his expeditions to the Arctic regions, beginning with the maiden voyage of the vessel in 1921.

Eugene Hardin is president and Frank L. H. Nason, treasurer and secretary of the corporation.

THE AMERICAN GLUE COMPANY

The American Glue Company is one of the pioneers in the glue industry of the United States, having been actively identified with its development and progress for more than 120 years.

The founder of the enterprise, Elijah Upton, began the manufacture of glue in 1808, in the town of Peabody, at that time called South Danvers. By consistent effort and enterprise he built up an extensive business, which has remained in the hands of the Upton family for three generations, the interests being passed from father to son. At different times various partners were admitted and the firm name was changed correspondingly, but from its inception to the present time, however, some member of the Upton family has been actively affiliated with the industry's growth and development. Today the business has grown and expanded until a mammoth corporation has been evolved, which occupies a position of commanding importance in its field.

In 1894 the interests of the Upton estate were merged with other concerns in a New Jersey corporation, operating under the name of the American Glue Company. From 1894 until 1900 this corporation expanded and acquired a number of smaller companies, chief of which were the Boston Flint Paper Company, the Union Sandpaper Company, the sandpaper business of Wiggins and Stevens, the Pennsylvania Glue Company, and the Illinois Glue Company.

In 1906 the present corporate body—American Glue Company—was organized under the laws of Massachusetts, and it acquired from the New Jersey corporation practically all of the business interests that it had purchased.

At the present the American Glue Company, of itself or through its subsidiaries, owns or controls nineteen different plants, the principal of which are located in Cambridge, Everett, Peabody, and Walpole in this state; in Philadelphia and Springdale, Pennsylvania; San Francisco, California; and in Hammond, Indiana. The Walpole plant is engaged exclusively in the manufacture of sandpaper, while the others produce glue, principally. Distribution is effected through a nation-wide organization of sales warehouses or branch stores, and through authorized agents, the more important of these units being located in Boston, New York, Chicago, Philadelphia, Detroit, St. Louis, and San Francisco.

In addition to this domestic organization, the American Glue Company controls glue and abrasive factories and distribution agencies in the Dominion of Canada, while foreign agents represent the company in England and on the Continent. Several of the domestic stores that are located near central shipping points carry on considerable foreign selling as well.

The name of the company is somewhat misleading, for its production is by no means confined to glue. Numerous other commodities are manufactured and sold by it, including all kinds of abrasive papers and cloths, edible and technical gelatine, isinglass, soap, poultry foods, and fertilizers.

The present large factory at Peabody occupies the site of the original enterprise founded by Elijah Upton a hundred and twenty-two years ago. It might fittingly be termed the home of "Union Glues and Abrasives," which is the trade-mark under which the company's products are marketed.

The officers of the corporation are: president, Jesse P. Lyman; vice

presidents, Robert W. Young, Frank W. Lyman, Albert Goodhue, and Edward C. Wright; treasurer, Robert W. Young; assistant treasurers, Henry P. Jacob, Thomas Curtis and Roger Upton; clerk, Roger Upton; assistant clerk, W. D. Fifield.

The corporation employs approximately 2,500 operatives and has capital of $5,750,600. The company's main office is at 121 Beverly Street, Boston.

The formation of the American Glue Company during the first decade of this century indicates that the spirit of industrial adventure is far from dead in this Commonwealth.

A group of Massachusetts men, appreciating that this enterprise which had been inaugurated in the opening decade of the previous century, should continue to be managed and directed by Bay State capital and brains, acquired the assets of the concern which had been formed a few years before, and created a new corporation under the laws of this Commonwealth which for twenty-four years has extended its operations until today it has no rival for leadership in its field of manufacture.

THE CARR FASTENER COMPANY

Housed in one of the city's most attractive industrial plants, including a group of modern concrete and steel structures, in the building of which special attention was paid to the introduction of daylight by providing mammoth windows, the Carr Fastener Company takes its place among the enterprises of Cambridge whose growth and importance has gone hand in hand with the automobile age.

Manufacturing a line of commodities which has given it preëminence in its field of production its well-known DOT fasteners have become the recognized standard automotive fasteners on both domestic and foreign makes of cars.

The three side locking fastener, the Lift The Dot, the Durable guaranteed snap fastener, the Veltex carpet fastener and numerous others make up a complete line satisfying the fastener needs of various and numerous industries, while the DOT Line Fasteners are used on overshoes, work clothes and leather goods of all kinds, including leather sport jackets.

Long since the company's inventive geniuses justified the use of the slogan, "a fastener for every need," and no concern in America, engaged in this type of production, has grown faster or shown greater progress in its field than the Cambridge concern, which, beginning in a modest way with a mere handful of employees, has developed into one of the largest employers of labor in the University City and one of the biggest producers of fasteners in the world.

It constantly carries upwards of 500 operatives on its payrolls, and employs capital of $2,000,000.

Another important product is the DOT line of lubrication devices, and here again the corporation offers a complete lubricating service, which includes high pressure hand guns and nipples, a large capacity electric tank, Nozzle-Fil hand guns, the DOT lubricant and finally the Dot-o-Matic Cup, which is made in three sizes, one, three and four ounce capacity. These devices are adjustable and feed a predetermined amount of lubricant to bearings while the latter are in motion.

These unique and almost uncanny devices have solved many vexatious lubricating problems and enjoy a universal distribution.

The contributions of the concern to the fastener and lubricating fields have been signal and valuable, and they have added to the reputation of

Massachusetts as the habitat of quality products that contribute to the economic welfare of the world.

An engineering service is maintained by this progressive company to assist in the solution of the fastener and lubrication problems of its many customers, and, in addition to the main factory, at 31 Ames Street, Cambridge, branch plants are owned and operated in Hamilton, Ontario, by the Carr Fastener Company, of Canada, Ltd., and in Stapleford, Notts., England, by the Carr Fastener Company, of Great Britain, Ltd. In 1927 a plant was purchased in Australia and is now operated there. Branches are carried on at 45 West Thirty-fourth Street, New York City, at 40 Selden Avenue, Detroit, Mich., and in the Monadnock Building, San Francisco, Cal.

Moses F. Canada is president; Preston Upham, vice president, Lewis I. Prouty, treasurer, and Charles H. Glidden, secretary.

THE JOHNSON MARBLE COMPANY

In 1906, The Johnson Marble Company was established to produce and market imported and domestic marble, depending at the outset on the local and vicinity market. By a consistent application of absolute integrity and careful production, the concern grew to be one of the largest producers of finished marble in the United States, and now employs seventy-five skilled artisans.

The corporation has capital of $250,000. Thomas J. Johnson is president and treasurer, and he is firmly of the opinion that if a concern like his own is fortunate enough to be carrying on its business in this section of the country it will have little or no difficulty in securing the most skilled labor that is available. A. P. Newman is secretary of the concern.

THE HINGHAM KNITTING COMPANY

In 1906 the Hingham Knitting Company was established and was incorporated the following year, with capital of $50,000, which has since been increased to $100,000. It is engaged in the production of men's seamless hosiery, and upwards of one hundred operatives are employed. Howard E. Page is president, and J. S. Hathaway is treasurer, vice president and secretary. In 1929 the enterprise was removed to Lowell, where larger facilities were secured.

F. P. Stewart is engaged in the manufacture of men's and women's mercerized and lisle hosiery.

THE KAPLAN FURNITURE COMPANY

In 1907, Isaac Kaplan threw an emigrant's bag and a few tools of his trade upon the bare floor of a rear room, at 60 Osborne Street, in Cambridge, jingled twelve cents representing his sole capital, and announced to his wife that the Kaplan Furniture Company was ready to begin business.

Twenty years later, on December 23, 1927, the same Isaac Kaplan paid $250,000 for that rear room and the rest of a city block, where today is housed the company bearing his name, and which has become in less than a quarter of a century the leading specialist in the manufacture of colonial reproductions.

Lacking even a penny of insurance, the founder of the company saw his original little Osborne Street factory go up in smoke within three weeks after he located there, in 1907, but President W. A. Bullard, of the Harvard Trust Company, had become so impressed with Kaplan's ability

and ambition that he promptly loaned him $100 to start over again, and today the beneficiary of that meagre capital is one of the trust company's largest depositors.

With new tools and lumber purchased through the loan, Mr. Kaplan finished two tilt-top tables before Saturday noon of the first week, and loading them on his back trudged to the store of Jordan Marsh Company where he sold them for $6, spending the amount for new lumber on his way home. His second consignment of two more tables found such favor with the department store officials that they gave him orders which warranted his employing a helper.

Within two years a partner placed $1,500 on Mr. Kaplan's bench to purchase a half interest in the growing business, and ten years later, when larger quarters had been taken at 80 State Street, Kaplan paid the partner $55,000 in order to continue the business alone.

Today, the Kaplan Furniture Company has capital of $150,000 and employs upwards of 125 operatives in the manufacture of reproductions of furniture, and included in its force is a corps of salesman who travel from its Chicago, New York and San Francisco offices. A feature of the growth of the concern is the participation of the employees in the production profits. Four of his workers have been with the concern since the first few months of operation.

Mr. Kaplan is president and treasurer, and W. Weinstein, secretary of the corporation.

THE CLIMAX PAPER BOX COMPANY

In 1907 G. G. M. Bond and Alfred M. Bond, father and son, the former at that time president of the Novelty Paper Box Company of Hudson, which had been incorporated in 1892, formed the Climax Paper Box Company and began business in leased quarters on Clarendon Avenue, North Cambridge. A year later the Climax concern erected its present commodious factory, on Cottage Park Avenue, where 150 operatives are employed in the manufacture of paper boxes.

The corporation has capital of $76,000, and Harold A. Bond is president and secretary, and Alfred M. Bond, treasurer.

THE OLDEST RADIO MANUFACTURING CONCERN IN THE UNITED STATES

The most recent major industrial development in the world is the radio and it is a matter of fact, as well as history, that despite the frequent assertions of those who are unacquainted with the progress of American manufactures to the effect that Massachusetts and New England have not experienced the thrill of producing an original commodity in a generation or more, yet it is an historical fact that the oldest manufacturer of radio apparatus in the United States carried on business in Kendall Square, Cambridge, where there was located, in 1907, the Clapp-Eastham Company, which was formed that year under the name of Clapp and Eastham, by J. Emery Clapp, president of the Clapp-Anderson Company, of Boston, manufacturers of X-ray apparatus, and Melville Eastham, head of the General Radio Company, of Cambridge. The partnership was formed in Boston, in 1906, but the following year the concern removed to Central Square, Cambridge, and six months later it located on the first floor of the building at 139 Main Street, Kendall Square. O. Kerro Luscomb, of Newton, became identified with the company at that time, and on January 1, 1908, the Clapp-Eastham Company was incorporated. Mr. Luscomb shortly afterwards purchased the interests of Mr. Clapp in the days when

"radio" was unknown, and when "wireless" was regarded as a toy or as a novelty for experts to experiment with.

In these early days of the development of radio the Clapp-Eastham Company placed on the American market the first rotary variable condenser, the first tuning coil and the first receiving transformer or loose coupler, and by many other notable advances built up a name for progressiveness and for quality which has resulted in its present product being a standard throughout the world.

In 1916 Mr. Luscomb acquired the interest of Mr. Eastham, and served as president and treasurer of the company. Under his management, the business grew until it occupied the entire building in which it originally used but one floor.

The Clapp-Eastham Company manufactured vacuum tube sets exclusively, following the discontinuance of the production of crystal sets.

THE THOMPSON BOX COMPANY

The Thompson Box Company was incorporated and began business in 1907, in the old Sparrow candy plant, at the corner of Hampshire and Clark streets, where the concern still operates.

T. H. Thompson was president, treasurer and general manager of the concern from its inception until January 2, 1929, when he was succeeded by Joseph H. Sheehan. The original capital of $20,000 has since been increased to $50,000, and upwards of 150 operatives are employed in the manufacture of paper boxes.

George H. Grey is treasurer and E. A. Connihan, Jr., clerk of the corporation.

THE OLMSTED-FLINT COMPANY

To tell the story of the Olmsted-Flint Company is to recite the migration of another New York industry to Massachusetts. In 1910 W. I. Olmsted, S. B. Flint, George S. Baker, and Frank M. Schiffmacher, began the manufacture of leather belting in New York City, and despite the fact that the latter was born and reared in Long Island, and had graduated from Syracuse University, he decided to transplant the business to Cambridge on January 1, 1915, when he purchased the interests of the other partners.

What was the reason, you ask? Because by far the largest percentage of the company's waterproof oilskin was marketed in New England, which fact determined Mr. Schiffmacher to bring the mountain to Mahomet.

He early took the position that the company should not only manufacture and sell leather belting, but that it should sell service with the product, and to accomplish this it was obvious that the company's plant should be located where it could equip the factories where its belting was used with all essentials to power transmission, and the concern became distributors of pulleys, hangers, shafting and other devices. It operates, in addition to its belting department, a completely equipped machine shop and mill-wrighting department, and executes the engineering details in connection with power installations.

In January, 1922, Everett H. Cargan became treasurer of the corporation.

The company does a large percentage of its business through agencies which carry complete lines of Olmsted-Flint beltings. Branches in Cuba and South America carry stocks and one of the largest distributors in England sells the company's oilskin belting exclusively in the British Isles.

The concern uses only native packer steer hides from cattle raised in

the open field, and employs only the long-time oak bark process of tanning, which is not forced or accelerated by the use of chemicals.

The company's oilskin belting is of the waterproof type, permanently proof against water, steam, oils, chemical fumes and practically every other atmospheric condition.

A few years ago the concern introduced its grip-tite belt, which is practically indestructible, being made of a specially tanned and finished leather, which gives it a grip on the pulley double that of other belts. It is unaffected by boiling water, live steam, heat up to 300 degrees or acid solutions.

These belts are sold under a positive guarantee of a quarter million miles of belt travel—a guarantee which allows the customer to figure definite costs of belting service.

Frank M. Schiffmacher is president, Frank G. Burns, secretary, and Everett H. Cargen, treasurer, of the corporation, which has capital of $80,000 and employs twenty-five operatives.

In 1910 the Liquid Carbonic Company established its New England branch in Cambridge, purchasing land and erecting a modern plant on Broadway, that year.

A. W. COX & COMPANY, INC.

For twenty years A. W. Cox & Company, Inc., has been located at 15 Hayward Street, and enjoys the distinction of being the first distributor appointed by the B. F. Goodrich Company of the well-known Goodrich tires. The concern maintains a complete service station for the handling of motor truck service, a fully equipped machine shop for repairing motor trucks.

In 1912 the company was incorporated, with capital of $14,500 and twenty-five operatives are employed.

A. W. Cox is president, and N. B. Todd, secretary.

THE BOSTON STRUCTURAL STEEL COMPANY

In 1906 the Guy S. Leavitt Company began business in Boston, removing to Cambridge, in 1911, where it occupied the plant now utilized by its corporate successor, the Boston Structural Steel Company, which was formed in December, 1915, with William P. Shine as its president and treasurer.

The original capital was $15,000, since increased to $90,000. President Shine had been superintendent of the Leavitt concern for many years before forming the new corporation.

Upwards of 100 men are employed in fabricating structural steel at the company's plant located at 241 Albany Street. B. Devereaux is secretary and Daniel M. Moriarity, assistant treasurer.

A. R. HYDE & SONS COMPANY

The manufacture of house slippers was begun in a small building, in Somerville, in 1910, by the A. R. Hyde & Sons Company, but the business was removed to its present factory, at Columbia and Windsor streets, in Cambridge, two years later, where the production which at the outset was but a few dozen a day, has been increased until at the present the concern manufactures 5,400 pairs of women's and children's footwear each day.

The company's distribution is to the wholesale and chain store trades almost exclusively, its goods being marketed in all parts of the United

States, as well as in Cuba, Porto Rico, Central and South America, and in the Canadian provinces.

The Cambridge factory is equipped with the latest type of shoe machinery manufactured by the United Shoe Machinery Corporation, and a sales office is maintained at 159 Lincoln Street, Boston. The corporation has capital of $150,000, and employs 350 operatives.

A. R. Hyde is president, M. C. Hyde, vice president, George Baskin, secretary, and Allan J. Hyde, treasurer.

THE CAMBRIDGE RUBBER COMPANY

Fifteen years ago there came into existence in Cambridge a manufacturing enterprise whose history is the marvel of the rubber world.

Starting in a modest way and with a small force of men, the Cambridge Rubber Company now has a capacity of 30,000 pairs of rubber footwear a day, employs more than 1,200 operatives and does a business of between $4,000,000 and $5,000,000 annually, its distribution not being confined to the United States, but being made in many foreign countries.

This enterprise was conceived by Warren MacPherson and George H. Rockwell, both of whom are today active in its management, the former having been its president since 1915, and the latter vice president since its formation, that year.

The company not only specializes in the standard types of rubber footwear, but it has evolved, perfected and introduced a number of well-known new designs, such as Raynboots and Raynshus in the form of light weight and attractive overshoes for women, while its canvas footwear is manufactured under the name of Sneex.

In addition to rubber and canvas shoes, the company turns out rubber clothing, molded goods, and rubber fabrics.

In 1920, Ernest W. Dunbar, for many years identified with the Apsley Rubber Company and its corporate successors, in Hudson, became a vice president and general superintendent of the Cambridge company. The Boston office of the concern is at 186 Lincoln Street.

Here again is a complete demonstration that the twentieth century has witnessed the rise of a concern which in a short fifteen-year period has become one of the leaders in the rubber industry of this Commonwealth, while Cambridge has gained a manufacturing enterprise that ranks among the first dozen in the city in the number of employees carried on the payrolls.

Warren MacPherson is president and George H. Rockwell and Ernest W. Dunbar, vice presidents.

THE S. C. SPERRY COMPANY

In 1915 Seth C. Sperry and Ernest A. Ware formed a partnership and began to specialize in the construction of industrial buildings. Four years later Kendall P. Foster became a partner, and in March, 1919, the S. C. Sperry Company, Inc., was formed, with Mr. Sperry as president and Mr. Foster, as treasurer.

It is an interesting fact in connection with the company's operations that 70 per cent of the business done by it has been accomplished for those for whom the concern has executed a minimum of three contracts, and an average of six. In 1920, it began its first building for the Standard Oil Company, of New York, and in less than ten years it has erected more than twenty-five other structures for the same company, all contracts having been awarded on a strictly competitive basis.

During all the years of its operation it has specialized on concrete construction, and while it does not solicit engineering design work, its has facilities for handling this phase of building.

Charles W. Cheney is assistant treasurer of the corporation.

THE NATIONAL COMPANY

In the class of 1913 graduated from the Massachusetts Institute of Technology was William A. Ready, who left that school with the degree of electrical engineer. Following his active entry into the manufacturing world, he was construction engineer for Stone & Webster, Inc., and later for the United Fruit Company, and in 1915 he became works manager and director of the National Company, Inc., of Cambridge, producers of mechanical, electrical, and radio engineering apparatus, much of which was designed and patented by him, several electrical devices being produced for the United States Government during the World War, for which the corporation received a distinguished service certificate as the result of Mr. Ready's engineering and inventive abilities.

In 1922 he became president and general manager of The National Company, which today employs 150 operatives. W. B. Hopkins is president and Walter H. Balcke, secretary. Included among its customers are the Federal Government, the General Electric Company, the Westinghouse Company, Dwight P. Robinson Company, and many of the large public utility corporations operating in the power field. Here is a concern that in a comparatively short period of corporate existence has paid almost 800 times its original capital investment, and it success is attributed by the officers to be due largely to the efforts of President Ready. In 1928 he was chosen president of the Ames Shovel & Tool Company of North Easton, following a survey of the production facilities of this concern, which he began in 1927, at the request of Stone & Webster, Inc., which corporation had become financially interested in this long-established manufacturing unit. W. A. Ready is president, L. R. Shaffer, vice president, Walter H. Balcke, secretary, and W. B. Hopkins, treasurer, and the corporation has capital of $51,000 and employs 150 operatives.

THE SANBORN COMPANY

In 1917, F. B. Sanborn, then a professor on the faculty of Tufts College, formed the Sanborn Company, to manufacture medical apparatus designed to diagnose metabolism and heart irregularities, and also engineering water level gages for rivers and sewers.

As its products are highly technical and require technical service, this is provided throughout the United States and Canada. The concern is one of the few industries in the Commonwealth whose commodities are marketed directly from the manufacturer to the consumer, without the intervention of agents, jobbers, or supply houses.

The Sanborn diagnostic apparatus is now a part of standard equipment in all great hospitals, and medical institutions in this and other countries.

Branch offices are maintained in New York, Chicago and St. Louis and the growth of the concern has been steady until today it employs seventy-five persons, and its sales aggregate more than $250,000 a year.

F. B. Sanborn is president and treasurer, G. C. Sanborn, vice president, and A. J. Arsenault, clerk. The corporation has capital of $62,000 and employs seventy-five operatives.

In 1918 The H. B. Smith Company, of Westfield, erected a large office

and warehouse structure, in Cambridge, served by a spur track from the Boston & Albany irons, and here a complete stock of the products of the concern is carried, the local branch being in charge of C. T. Flint, sales manager, assisted by William H. Gordon and a staff of salesmen, traffic and warehouse executives, and a large office force.

THE CREW LEVICK COMPANY

In 1918, when the Cities Service Company decided to open a new England Division, Kendall Square, Cambridge, was selected as the logical distributing point, and a three-story brick building, with frontage on two streets, and served by a spur track from the Boston & Albany irons, was purchased for office and warehouse purposes.

The operations are carried on by the Crew Levick Company, one of the largest producers, refiners and distributors of petroleum products in the world. In 1862, barely three years after the first oil well in this country was drilled in Pennsylvania, B. J. Crew and J. Lewis Crew laid the foundation of the concern. In those days refineries sprang up over night, notwithstanding that the science of refining was little known, and a mad scramble for production ensued. A hundred and one tricks were used to get the crude oil through, but the Crews resorted to none of them. These men had visions—ideals—and ideas. They operated along different lines, giving particular attention to each shipment and making quality their objective rather than quantity.

Emile E. Grignard is manager, and Bernard O. Pinkham, assistant manager, of the Cambridge unit.

THE DEWEY AND ALMY CHEMICAL COMPANY

Early in 1919, Bradley Dewey, who had been director of research in one of the subsidiary companies of the United States Steel Corporation, and a Colonel in the Gas Defense Division of the U. S. Army, during the World War, with Charles Almy, Jr., who for seven years was manager of the Virginia Red Oil Products Company, and who saw service as a Lieutenant-Colonel in the war, formed the Dewey and Almy Chemical Company, and began manufacturing operations at 235 Harvey Street, North Cambridge.

Both are natives of the city, and were classmates, both at Harvard and at the Massachusetts Institute of Technology, from which latter institution they graduated in 1909. In less than ten years the North Cambridge plant has grown from the small original structure of 1919 to thirteen buildings, and in 1924 a branch plant was established in Oakland, California, to take care of the company's distribution on the Pacific Coast and in the Far East.

In 1928 manufacturing operations were begun in Italy, and the following year the latest plant, erected at Farnham, Quebec, Canada, was placed in full operation. The corporation also maintains warehouses in Detroit, Baltimore and London.

All of the company's products have been developed through extensive research, and the high standards of quality established at the outset of operations have been constantly maintained through rigid laboratory control of the manufacturing methods employed. Of the company's present personnel, 16 per cent are technically trained men, while 13 per cent of the total are attached to the research laboratories.

The corporation has specialized in the production of commodities manufactured from rubber latex. Today their products include sealing com-

pounds employed in the manufacture of tin cans and bottle and jar caps; soldering fluxes used in tinning and soldering operations; adhesives for applying labels to glass and metal containers; shoe and hair cloth cements; soda lime required in absorbing carbon dioxide gas in submarines, gas masks, and metabolism apparatus; and machines for applying and drying their sealing compounds.

The success of the corporation in the foreign field carries a lesson to all progressive concerns operating in Massachusetts, for in less than a decade it has developed an overseas distribution which extends to more than thirty foreign countries, including England, Germany, Italy, France, Denmark, Holland, Belgium, South Africa, Australia, Persia, Japan, Soviet Russia, New Zealand, Brazil, Argentine, Mexico, and Canada.

Bradley Dewey is president, and Charles Almy, Jr., vice president of the corporation, which has a capital of $646,673 fully paid in cash, and employs 275 operatives in its several plants.

SOME LOCAL INDUSTRIES OF PROMINENCE

The Beckwith Manufacturing Company is preëminent in the field of manufacture of box toes, felt bottom fillers and invisible innersoles, and at its extensive factories in Cambridge and Roxbury, in this state, and in Dover, N. H., employs 300 operatives.

The corporation has capital of $1,000,000 and has its main offices in the Statler Building, Boston. Harry H. Beckwith is president, Hollis E. Goodwin, vice president, Walter F. Jennings, treasurer and John Abbott, clerk, these four officials constituting the board of directors.

One of the city's leaders in the production of confectionery is the H. N. Fish Company, specializing in the manufacture of chocolates, and employing upwards of fifty operatives. L. J. Brackett is president, H. B. Fisher, treasurer, and A. H. Brackett, clerk of the corporation, these three officials constituting the board of directors.

The plant is located at 40 Ames Street, and the corporation has capital of $37,000.

The advent of the radio age has been responsible for the development in Cambridge of one of the outstanding enterprises in this twentieth century field of manufacture—the General Radio Company—at whose plant, located at 30 State Street, more than 150 operatives are employed in the production of radio and electrical apparatus which enjoys a wide field of distribution.

The corporation has capital of $783,706, and Melville Eastman is president, E. H. Locke, vice president, H. B. Richmond, treasurer and secretary, and H. S. Shaw, Jr., chairman of the board of directors, which group comprises the above officials, and Lawrence Mayo.

For a generation the name of William Hennessy has stood for all that is best in the manufacture of high grade confectionery. The founder has always carried on business under his own name, both at the plant, located at 403 Massachusetts Avenue, and at the Boston retail store, and has enjoyed a clientele which embraces those who seek the highest grade of confections.

The Roberts Iron Works are operated at 180 Main Street, as a subsidiary of the Hodge Boiler Works, of Boston, and forty operatives are employed in fabricating boilers, tanks and smokestacks. Frank J. Holderried is treasurer of the concern.

The A. O. Wilson Structural Company employs thirty hands in the production of iron and steel work, Albert O. Wilson being president and treasurer.

THE CHANDLER MANUFACTURING COMPANY

In the spring of 1921, Proctor Chandler began the manufacture of knitted specialties at 95 Langford Avenue, Watertown, removing the business to Weymouth that fall. In April, 1922, he incorporated the business as the Chandler Manufacturing Company, with capital of $25,000, and became president, with Lawrence T. Sawyer, treasurer, and with Charles H. Sawyer and Peter Wanacek as the other directors.

In March, 1925, the plant was removed to 42 Carleton Street, Cambridge, and in the spring of 1929 to another location in the same city, at 56 Amherst Street.

The company was one of the first in New England to begin the manufacture of rayon fabrics, nearly a year being spent in experimenting with the new commodity on a New England-made machine, and being the first concern to use this type of apparatus. In April, 1926, the Chandler concern started the manufacture of underwear made from rayon fabrics, and it now employs thirty operatives and has capital of $100,000.

Proctor Chandler is president, W. W. Dow, secretary, and Lawrence T. Sawyer, treasurer of the corporation, which employs twenty-five operatives.

THE CANDO CORPORATION

The firm of Colony & Osgood takes its position among the pioneer United States manufacturers of silver polish in paste form and the business was established in Keene, N. H., in 1865, the original firm being succeeded by the Paul Manufacturing Company, located on Blackstone Street, Boston, which was purchased by the Cando Corporation, whose corporate designation is derived by using the letter "C" in Colony, and the letter "O" in Osgood, and combining them with the word "and," thus producing "Cando," under which the company's product has since been advertised and registered.

In 1921 The Cando Corporation located at 25 Thorndike Street, Cambridge, and two years later the concern was incorporated. Its products are widely distributed throughout this country, and in many foreign fields, and include, in addition to silver and metal polishes, incense, deodorizers and insecticides.

Noble S. Butt is treasurer and general manager, and the active head of the concern. Charles L. Bolster is president and Miles Wambaugh, secretary.

The corporation has capital of $125,000 and employs upwards of twenty-five operatives.

THE SERVICE DEPARTMENTS OF THE WILLIAM FILENE SONS COMPANY

In February, 1921, the William Filene Sons Company opened its service building in Cambridge, a structure 224 feet long by 60 feet wide, six stories in height, and containing the largest reënforced concrete beam installed in any structure in Boston—2 feet wide by 7 feet high. Here upwards of 200 employees are engaged in various types of manufacturing and service operations. The first floor is devoted to the package distributing and shipping departments, and a garage, all packages being placed in a shute and landing on a traveling belt, from which they are taken by attendants who arrange them for express, parcel post and delivery truck distribution.

In the basement are located the oil burning heating plant, the refrig-

erating unit, the air compressor, the carpenter and paint shops, and a general storeroom, lockers and washrooms for employees.

The second floor contains the fur-storage vaults occupying about three-quarters of the area, the remaining space being devoted to the fur cleaning department and the delivery office. Furs are cleaned here by a vacuum process. On the third floor is located a complete laundering plant, where all uniforms, towels and other linen used in the barber shops, hair-dressing parlors, and in the restaurant, located in the Boston store of the concern, are treated, some 75,000 or more pieces, including 3,000 to 4,000 that are starched, being treated weekly.

Here also are the company's printing plant, a restaurant, kitchen, rest room, library, first-aid room, hospital room, storeroom for the decorators, and workshop for repairing toys. The entire fourth floor is given over to the marking, with price tags, of the goods to be placed on sales in the Boston store.

The tailor shop occupies the entire fifth floor, and men's suits and overcoats, women's suits, coats and dresses and children's apparel are here manufactured.

The sixth floor is occupied as a supply room, all stationery, general office supplies, tags, wrapping paper, twine, cardboard boxes, etc., being housed here.

THE GEORGE B. GRAFF COMPANY

Percival G. Underwood founded the Underwood Glass Pin Company, which he operated in Philadelphia, until 1922, when he consolidated the business with the Graff Company, engaged in the same line of manufacture, and removed the business to Somerville, and from there to Cambridge, in 1927, where, under the name of the Graff-Underwood Company, production was vastly extended at the modern plant of the concern where a complete line of office devices, including clips, index tabs, marking tabs, thumb tacks, pencil sharpeners, picture hangers, and the Graffeo vise signal, which the company originated and manufactured. In 1929 the concern was reincorporated as the George B. Graff Company and has capital of $80,000. Upwards of fifty hands are employed.

George B. Graff is president, Leland S. Graff, treasurer, and C. W. Lipman, clerk.

THE DODGE-HALEY COMPANY

In 1924, in order to secure more adequate facilities in the handling of its increasing business, the Dodge-Haley Company erected a modern warehouse and office building, at 18 Hurley Street, Cambridge, and removed from Boston, where the business had been carried on for eighty-four years.

It was in 1840 that Solomon H. Dodge established himself on Kilby Street, Boston, being succeeded by the firm of Dodge, Gilbert & Company of which he was a member, thirteen years later. Following the great Boston fire, in 1872, the concern located at 56 Oliver Street, and later removed to 218 High Street.

In 1883 the present Dodge-Haley Company came into being as a partnership, and in 1904 was incorporated under the same name by William H. Haley, Haywood Dodge, a son of Solomon H. Dodge, Frank A. Marvin, Luther North, Richard King, Charles A. Haines, and George Cummings.

In 1915 the Dodge interests were purchased by the company and the

stock placed in the treasury. On the death of William H. Haley, son-in-law of the founder, Solomon H. Dodge, the presidency of the concern passed to his daughter, Mrs. L. G. S. Marvin, and when her husband, Frank A. Marvin, died, in 1920, their son, Dr. Frank W. Marvin, was chosen treasurer. In 1922, Charles L. Fellows, a cousin of Mr. Haley, became vice president and general manager. These three officers now own the entire stock of the company, which is capitalized for $130,000.

The concern handles iron and steel, bolts and screws of all kinds, nuts, washers and small tools for machinists, and blacksmiths and for mill uses, and employs fifty operatives.

The House of Byer, Inc., was incorporated in 1924, and has capital of $92,300. Fifty operatives are employed in the manufacture of silk and wool and cotton and wool hosiery. Louis E. Byer is president, S. J. Byer, secretary, and L. J. Byer, treasurer.

THE FANNY FARMER CANDY SHOPS, INC.

In June, 1925, the Fanny Farmer Candy Shops, Inc., which had been organized in Rochester, N. Y., in February, 1919, began operations in Massachusetts, opening a studio, in Cambridge, where it maintains its Bay State headquarters. Since that time twenty-four shops have been opened and are being operated in this section.

The original capital of $200,000 has grown to $1.000,000, and, in 1923, a chain of stores operating under the name of Grace Darling, was acquired. The Rochester, N. Y., studio supplies twenty-six shops in that section; the New York City studio supplies forty-six stores; the Minneapolis, Minn., studio serves twenty-six shops; and another was opened, in Cleveland, Ohio, in 1928, which serves the shops throughout the state, and Pennsylvania.

Frank P. O'Connor is president, J. D. Hayes, vice president, W. J. O'Connor, second vice president, C. P. Moher, third vice president, C. H. Ellston, treasurer and secretary.

The Fanny Farmer Candy Shops are outstanding in appearance, being finished in a high gloss white, trimmed in black, with standard signs and panels, while the architecture, decorations, draperies, interiors, and candy cans are identical. Cleanliness in appearance as well as in actual conduct of the business has been one of the outstanding features of the enterprise, and purity and wholesomeness of the confections, the use of the best materials, and the insistence upon quality products, have contributed to the success of the concern.

The L. E. Zurbach Steel Company began business January 1, 1925, when Louis E. Zurbach, for several years sales manager of the Wetherell Brothers Company opened an office at 145 Oliver Street, Boston, soon after removing to 10 High Street. Later, he established a warehouse on Binney Street, in Cambridge, still retaining the Boston headquarters, but in September, 1928, he located both his office and warehouse in the Terminal Building, at 130 Sixth Street, Cambridge—one of the structures formerly occupied by the Worthington Pump & Machinery Corporation. The concern deals in all types of strip and sheet steel.

THE JOHNSON-APPLEBY COMPANY

For many years the Johnson-Appleby Company has ranked among the leading manufacturers of food products in New England, and in the new six-story factory it erected on Memorial Drive, in 1927, are embodied many original and useful ideas, conceived by J. T. Appleby. The building

is equipped with the most improved machinery and up-to-date devices for rapid and efficient service in producing, storing and shipping the table delicacies made by the concern. The floors, walls and columns are all of Terazzo marble, devoid of a single crevice in which dirt, dust or soot may find lodgment, and engineers estimate that the time saved in cleaning is two thirds of what would be required had the customary interior finish been installed.

The structure, which has a 200-foot frontage on Memorial Drive, is 60 feet in depth.

The Johnson-Appleby Company is unique in other respects, as its second largest stockholder is a woman—Miss Cora E. MacKenzie, who is thoroughly familiar with every phase of the activities of the corporation, and who is well known from coast to coast in the food purveying trade.

The table delicacies of the company are marketed under the "Old Honesty Brand," and include pure fruit jellies, preserves, jams, relishes, marmalades and canned fruits and vegetables.

E. H. Johnson is president, Cora E. MacKenzie, secretary, and J. T. Appleby, treasurer, of the concern, which maintains a Boston office at 218 State Street, and employs forty operatives.

THE JOHN E. CAIN COMPANY

The John E. Cain Company, engaged in the manufacture of mayonnaise and sandwich spread, marketed under the name of the founder of the concern, John E. Cain, occupies a plant which ranks as one of the most modern of its type in the country. Located on the grand junction of the Boston & Albany Railroad Company, all salad oils, glass, and other supplies are received in carload lots, thus eliminating trucking and unnecessary handling.

The products are manufactured by automatic machinery and are not touched by human hands from the time they are mixed until the finished product is packed in the shipping cases.

The concern employs fifty operatives, has a Boston office at 17 Fulton Street, is solely owned by John E. Cain, and in 1928 produced and sold more than two million bottles of its products, throughout the New England market.

In 1927, the Jordan Marsh Company acquired the Gray & Davis plant, in Cambridge, and soon afterward added a one-story extension of reinforced concrete, 385 by 77 feet, and designed to carry four additional stories.

THE CAMBRIDGE WASTE COMPANY

In June, 1928, the Cambridge Waste Company purchased one of the idle buildings formerly occupied by the Worthington Pump & Machinery Corporation, and began dealing in mill remnants, waste, and paper. W. F. Dowling and K. T. Ryan constitute the partnership.

THE TOLONIC MANUFACTURING COMPANY

In 1928, The Tolonic Manufacturing Company was chartered under the laws of this Commonwealth, with $50,000 capital, and began the manufacture of automobile running boards in the plant formerly occupied by the Sylvester Tower Manufacturing Company. The construction of the boards, where the bolts are attached through the hangers, is patented and constitutes a great improvement over any similar commodity on the market.

JOHN MORRELL & COMPANY

In 1929, John Morrell & Company which has kept in one family a business founded in Yorkshire, England, 103 years ago, acquired land adjacent to the Northern Artery, and began the erection of a new plant of reinforced brick and concrete construction, two stories high, with a basement, covering 11,000 square feet of land area, the building being of Colonial design, including the famous pineapple motif, where its new England operations which have been carried on in this section for thirty-four years, are now centered.

The structure is equipped with modern refrigeration and equipment for smoking meats, boiling hams, and handling dairy products, including eggs and cheese received from the six New England states, and from New York state.

In 1929, the Coca-Cola Bottling Company, a subsidiary of the Coca-Cola Company, of Atlanta, Ga., erected a manufacturing and warehouse plant, in Cambridge, which serves as its distributing center for New England.

The same year the Boston Sand and Gravel Company erected a concrete mixing plant, in Cambridge.

THE JONES & HEWETT OPTICAL COMPANY, INC.

In 1920 A. D. Jones and F. H. Hewett organized the Jones & Hewett Optical Company and began the manufacture of high grade optics for scientific instruments, at Jamaica Plain, and in June, 1929, the concern was incorporated under the laws of Massachusetts as the Jones & Hewett Optical Company, Inc., and removed to a new plant on Clarendon Avenue, North Cambridge.

It now produces lenses, prisms and parallel mirrors as well as optics and glass work for the makers of scientific instruments.

A. D. Jones is manager, and upwards of fifty hands are employed.

In the fall of 1929 the Alvita Fruit and Produce Company officially opened a plant in Cambridge, and began the manufacture of a new cocoa-flavored breakfast food.

The Enterprise Moakler Company purchased one of the large unoccupied units of the American Net & Twine Company in the city, and began the manufacture of mattresses at the end of 1929.

The F. S. Webster Company of Boston, manufacturers of carbon paper and typewriter ribbons, in 1929, announced its intention to erect a new plant in Cambridge.

THE N. RUSSELL LYNN COMPANY

The N. Russell Lynn Company is the exclusive New England sales and service representative of the Rex All-Season automobile tops, manufactured by the Rex Manufacturing Company of Connersville, Ind., and also carries on a large business in general automobile trimming, painting and body repairing.

N. Russell Lynn is president and treasurer of the corporation, which now occupies a part of the plant formerly owned by the Broadway Iron Foundry Company.

The McNamee Bookbinding Company succeeded to the business operated for many years by J. H. H. McNamee, whose family was identified for a long period with the bookbinding art.

One of the plants of the New England Brick Company is operated at

North Cambridge, and Parry Brothers, of Boston, own two brick yards in Cambridge.

The Burnham Boiler Corporation, a subsidiary of a New York concern, established a plant in Cambridge, in 1929.

The Standard Plate Glass Company maintains its New England warehouse, at 270 Albany Street, Cambridge.

The Milton Chemical Company manufactures mops at its East Cambridge factory, W. C. Howe being president, and W. D. Stockbridge, treasurer.

In 1929, the Seiberling Rubber Company leased for a term of years a warehouse in Cambridge, where the New England distribution of its products is carried on.

F. A. Carlton is engaged in the manufacture of silk, rayon and combination yarn and machine, twist and sewing silks, his plant being equipped with 10,000 spindles. One hundred hands are employed.

One of the Massachusetts plants of the Beckwith Manufacturing Company of Boston is located in Cambridge.

THE WILLIAM COULSON COMPANY

The William Coulson Company with offices in the Kendall Square Building, in Cambridge, is one of the leading building firms of Greater Boston.

Throughout New England this concern has erected many fine structures, including banks, churches and industrial buildings, and is organized and equipped to handle efficiently any building project, large or small.

William Coulson is sole owner.

OTHER IMPORTANT MANUFACTURING ENTERPRISES

The Acme Apparatus Company whose plant is at 37 Osborn Street, employs upwards of 100 operatives in the production of transformers and radio apparatus. The corporation has capital of $300,000 and ranks as one of the city's fast growing industries. C. F. Cairns is president, Joseph Joyce Donahue, clerk, and G. E. M. Bertram, treasurer.

The Acme Holmes Oil Burner is one of the newer industries of Cambridge, and has capital of $20,000. It employs twenty-five operatives in the manufacture of oil burning equipment. F. A. Bradford is president and treasurer.

Frank R. King is president, Noble S. Butt, treasurer and Charles S. Bolster, secretary, of the American Metal Polish Corporation, which has capital of $50,000 and manufactures metal polish at its plant, 25 Thorndyke Street.

The American Optical Company, of Southbridge, operates a branch plant, in Cambridge, where optical goods are produced.

Auto accessories and spring covers are produced at the plant of the Anderson Manufacturing Company which has capital of $25,000. W. S. Ferguson is president, and W. T. Ferguson, treasurer.

The Apex Chocolate Company employs 175 operatives in the manufacture of high grade chocolates at its modern plant, located at 45 Ames Street, the concern being capitalized for $650,000 and taking rank as one of the city's larger confectionery industries. F. L. Daggett is president, A. P. Stone, secretary, and Frank Wrye, assistant treasurer.

The Ararat Grocery Company, Inc., whose main office is at 150 Commercial Street, Boston, operates its factory in Cambridge, where twenty-five hands are employed in producing cereal products. N. M. Tovmassian

is president, S. T. Atamian, vice president and secretary, and G. Sarkisian, treasurer.

One of the plants of the Atwood & McManus Box Company whose main headquarters are in Chelsea, is located in Cambridge.

The Austin-Hastings Company, Inc., is the distributor for New England of the National-Shelby seamless steel tubing and steel boiler types, the Wilson electric welding machines and welding wires, as well as of shafting and screw stock. Its plant is located at 266 Binney Street.

Fifty hands are employed by the Automatic Cone Company at its 93 Clark Street plant, James Denaro is the sales manager of the concern, which produces ice cream containers of various types.

A. W. Baker is the proprietor of the Baker School Specialty Company, manufacturers of school specialties, and he employs fifteen operatives.

Trade publications constitute the production of the Barker & Trademan Press, Inc., of which G. L. Cross is president, L. F. Warren and K. F. Warren, vice presidents, David G. Mackie, secretary, and George R. Glendining, treasurer. The corporation employs sixty operatives.

Eugene F. Ehlert and George F. La Croix, as partners, own and operate the Bay State Broom Company which manufactures brooms at its North Cambridge factory, located at 167 Pemberton Street.

Soda water flavors are produced by the Blue Seal Extract Company of which Stephen R. Casey is president and treasurer. Twenty-five hands are employed.

The Boston Blacking Company, which formerly carried on manufacturing operations in Chelsea, removed several years ago to a modern plant on Third Street, East Cambridge, where upwards of 200 operatives are employed in the production of blackings, stains and rubber cements. The corporation has capital of $600,000. Henry S. Hubbell is president, H. Webb Hyde, vice president, E. N. Chase, secretary, and Halsey E. Abbey, treasurer.

With authorized capital of $1,000,000 the Boston Bookbinding Company, Inc., takes its place as one of the largest local concerns in the field of bookbinding, and employs upwards of 150 operatives. E. A. Gordon is president, and Edmund J. Barnard, treasurer.

Frank T. Coffin is the owner of the Boston Machine Screw Company which is engaged in manufacturing screw machine products at its plant, located at 17 Tudor Street.

Metal ceilings are manufactured at the 73 Vassar Street factory, of the Boston Metal Ceiling Manufacturing Company whose main office and headquarters are at 27 Haymarket Square, Boston, and of which James P. Archer is president, and William C. Torrey, treasurer and secretary. The concern has capital of $130,000 and employs fifty operatives.

One of the five Massachusetts plants of the Boston Sand & Gravel Company is located in Cambridge.

With capital of $40,000 the Boston Sherardizing & Electro Plating Company produces electro-plated ware, at its factory at 220 Sixth Street. Ernest Houghton is president and Frank S. Reynolds, treasurer and secretary.

Willow and reed furniture are produced at the local plant of the Boston Willow & Willowcraft Shop, located at 2225 Massachusetts Avenue, where twenty-five hands are employed. The main office and headquarters are at 42 Everett Street, in the Allston district of Boston. Louis Stoughton Drake is president and treasurer, and L. B. Drake, secretary.

The James W. Brine Company manufactures athletic goods at its 55

Carleton Street factory, where forty operatives are employed. The corporation has capital of $38,000 and maintains its main offices and headquarters at 92 Summer Street, Boston. Louis C. Brine is president and treasurer, and Edward D. Brine, secretary.

Weather strips and screens constitute the products of the Bronze Weather Strip Company which has capital of $50,000. C. K. Lawton is president, and W. H. Godfrey, treasurer.

The Browning-Drake Corporation produces radio apparatus at its 110 Brookline Street plant, where 125 operatives are employed. Lawrence D. Yont is president and Alonzo E. Yont, treasurer.

The Cambridge Smelting Company of which David Goose is president and Maurice Yozell, treasurer and secretary, manufactures solder and babbitt, and employs twenty-five operatives. The corporation has capital of 135,000.

The Campfire Company employs 150 operatives in the manufacture of confectionery. P. L. Redel is president, A. R. Olson, vice president, C. O. Ludwig, secretary and treasurer, and O. M. Loeffler, treasurer.

Waterproof garments are manufactured by the Cosmopolitan Manufacturing Company at its 56 Amherst Street plant. The partnership is made up of Fred Monosson, Hyman Weiner and Charles Aronson.

The Durand Company of Boston has its plant at 40 Ames Street, where 175 operatives are engaged in the production of confectionery. The corporation has capital of $100,000 preferred stock, and 4,000 shares of no par common stock. L. J. Brackett is president and treasurer, Henry B. Fisher, vice president and A. H. Brackett, clerk.

Seventy-five hands are employed by the Dyer Sales & Machinery Company at its plant at 155 Brookline Street, where replacement pistons oxy-acetylene apparatus constitute the main products. R. A. Pickens is president, J. M. Curtin, secretary, and George H. Dyer, treasurer.

Metal cornices, slate and gravel roofing and skylights constitute the products of the Eagle Cornice & Skylight Works, of 197-201 Sydney Street, which corporation employs fifty operatives, and has capital of $25,000. Edward E. McGanty is president and Morris Steinwetz, treasurer and secretary.

The Elhide Company employs 25 hands in the manufacture of shoe findings, John C. Rinkle being president, M. E. Walsh, secretary and Harry I. Reed, treasurer.

One of the city's large and growing manufacturing enterprises is The Elliott Addressing Machine Company which has capital of $2,000,000 and employs upwards of 500 operatives. The development of office appliances and mechanical devices for increasing efficiency of operation has afforded this company an ever-widening field of distribution, and its products enjoy a world-wide reputation and sale. H. P. Elliott, the founder of the concern, is president and treasurer and John R. Moulton is secretary. The company's addressing machines are standard equipment in the offices of many of the leading corporations of this and other countries.

The Enterprise Manufacturing Company manufactures copper boilers at its plant, located at 275 Third Street, and employs fifty operatives. The corporation is capitalized for $200,000. J. R. Doherty is president, V. M. Lander, vice president and S. K. Lander, treasurer and secretary.

Soon after the advent of the automobile, Ernest Flentje of Cambridge turned his inventive genius to the field of shock absorbers, and after a long series of experiments, he evolved a product which since it was placed on the market has earned a larger and larger place year by year. The

Cambridge plant, at 1643 Cambridge Street, being insufficient to care for the required production, a branch factory was established at 1887 Atlantic Avenue, Brooklyn, N. Y., some years ago. The concern is owned by Ernest Flentje, its founder.

For many years Austin Ford's services were sought by those who were interested in creating formal gardens, and his cut granite and bluestone products found wide distribution. The activities of the firm now known as Austin Ford & Son are carried on today by Joseph B. Ford, who employs upwards of thirty operatives.

William A. Morrill is the owner of the L. J. Foss Company which employs twenty-five operatives in the manufacture of hard candy.

Gordon-Taylor, Inc., with capital of $40,000, has long specialized in printing and employs forty operatives. G. Gehman Taylor is president, A. W. Sayward, secretary and Eugene H. Gordon, treasurer.

Cambridge having been so long the seat of large and flourishing confectionery and biscuit enterprises it was but natural that there should be created concerns to cater to the mechanical needs of these industries. The J. W. Greer Company owned by J. W. Greer employs fifty operatives in the manufacture of machinery for candy and biscuit plants.

Optical goods are produced by the Harvard Manufacturing Company which has capital of $10,000 and which employs twenty-five hands. Samuel Tichnor is president, Alton Grauman, secretary and Louis Tichnor, treasurer.

The headquarters of the Harvard Pickle Works, Inc., are at 172 Thorndike Street, Cambridge, but the company's factory is located in South Deerfield. The products are pickled goods, relishes and vinegar and twenty-five hands are employed. C. Goldfarb is president, M. I. Gorsey, secretary and F. Goldfarb, treasurer, of the corporation, which has capital of $25,000.

Twenty-five hands are employed by the S. D. Hicks & Son Company in the manufacture of copper boilers. A. M. Erickson is president and E. A. Erickson, treasurer of the enterprise.

For many years artificial teeth have been manufactured in Cambridge by Ideal Tooth, Inc., which corporation has capital of $200,000 and employs seventy-five operatives. Simon Myerson is president, M. C. Redmond, secretary, and Joseph Myerson, treasurer.

International is the fame of the Johnson Educator Food Company, which has capital of $750,000 and employs 250 operatives in the manufacture of biscuits, crackers and wafers under the name of "Educator." E. Fred Cullen is president, and P. P. McGrath, treasurer, of the corporation, which occupies a large plant at 100 Sidney Street.

The automobile industry gave rise to the formation of George Lawrence, Inc., which concern employs twenty-five operatives in the manufacture of automobile springs. G. Duthie Strachan is president, Charles H. Hemstreet, secretary, and George Lawrence, treasurer. The corporation has capital of $90,000.

Fifty hands are employed by A. Lualdi, Inc., in the manufacture of ecclesiastical furniture in wood and marble. The concern operates branches in Boston and Florence, Italy. Angelo Lualdi is president, and Charles Drew, treasurer and secretary.

One of the enterprises of the city that has grown by leaps and bounds since it came into being this decade is the Mavis Corporation, which now employs seventy-five operatives, in producing its widely advertised bever-

ages. Walter V. Pearson is president, Thomas A. Fitzgerald, secretary, and George Barnes, treasurer.

The Mayflower Publishers, Inc., employ sixty hands in the manufacture of greeting cards. Samuel Tichnor is president and Louis Tichnor, treasurer, of the corporation.

Fire doors are manufactured by Metal Clad Doors, Inc., which concern has capital of $60,000 and employs twenty-five hands. Percy H. Callbeck is president, W. R. Marcotte, secretary and C. M. Logan, treasurer.

The F. H. Newton Company employs seventy-five operatives in the production of doors, windows, panes and blinds, and in addition to operating a large plant at 34-40 Cameron Avenue, in Cambridge, also maintains a factory in Somerville, employing in both units seventy-five men. The corporation has capital of $65,000. George Little is president, Peter Tasher and George Little, Jr., vice presidents, Frederic H. Newton, treasurer, and P. C. Newton, assistant treasurer.

The Oxford Candy Company employs 150 operatives in the production of confectionery, at its plant at 185 Albany Street. Robert H. W. Welch, Jr., is president, E. P. Savage, treasurer, and E. C. Silverstein clerk.

The Peters Electrotype Company has capital of $100,000 and employs twenty-five hands in electrotyping. R. S. Blanchard is president and treasurer and Mason H. Stone, secretary.

Hard candy and bulk chocolate confections are manufactured by the Potter Confectionery Company, of which Arthur H. Potter is president, Thomas E. Cotter, vice president and general manager, and I. S. Potter, treasurer.

Children's dresses are produced in large volume by the Prendiville Michelson Company, Inc., at its plant located at 28 Carleton Street. The corporation employs 130 hands. Jane Prendiville is president, Joseph B. Welch, clerk, and J. Leonard Michelson treasurer.

One of the two Massachusetts plants of the Prest-O-Lite Company is located in Cambridge, where dissolved acetylene is produced.

Arthur J. Lush is president, Arthur P. Teele, secretary and James F. Corr, treasurer, of the Rawson Electrical Instrument Company which has capital of $50,000 and employs twenty-five in the manufacture of electrical testing instruments.

The Resisto Pipe & Valve Company operates its main factory at 252 Bridge Street, East Cambridge, and a branch unit in New York City. At the local plant, twenty-five employes are engaged in manufacturing acid resisting pipe, valves and fittings. The corporation has capital of $75,000, E. A. Taft is president, and G. A. MacDowall, treasurer.

Sixty hands are employed by William F. Ross & Company in the production of interior finish, the concern being owned by William F. Ross, its founder.

Russell & Company, Inc., has capital of $90,000, and employs 100 operatives in the manufacture of confectionery. F. S. MacDonald and O. C. Bohlin are vice presidents and W. H. Herrick, treasurer, of the corporation.

Rust proofing iron and steel is manufactured by the Rust Proofing & Metal Finishing Corporation, which is managed by J. N. Tuttle, as president and treasurer. The corporation has capital of $50,000 and employs twenty-five hands.

The firm of D. Frank Ryan, of which John Ryan is president and D.

Frank Ryan, secretary and treasurer, manufactures perfumed products and cosmetics, and employs thirty operatives.

Seventy-five employees are engaged in the manufacture of clock cases and wood novelties by Wilfred F. St. Coeur, Inc., at its North Cambridge plant. W. F. St. Coeur is president, secretary and treasurer of the corporation.

The E. F. Scheibe Company of North Cambridge, managed by E. F., H. M., and R. R. Scheibe as trustees, employs thirty-five operatives in manufacturing small parts from sheet glass.

The Standard Nut Company, of which Norman Bernard is president and treasurer, and Emanuel Bernard, secretary, employs thirty operatives in the preparation of salted nuts.

One of the three United States factories of the Standard Plate Glass Company is located at Cambridge, and the Massachusetts office and headquarters are at 45 Sudbury Street, Boston.

Seventy hands are employed by Alexander Thomson, Inc., in the preparation of cut stone. The corporation has capital of $77,500. John J. Hannon is president, Carl Triangalo, vice president, and Thomas L. Devine, secretary and treasurer.

The United Stay Company has capital of $50,000, employs sixty operatives, and manufactures shoe trimmings. George H. Littlefield is president, James S. Kane, vice president, Paul A. Daniels, secretary, and Paul S. Vaitses treasurer.

The Massachusetts factory of the Ward Baking Company whose headquarters are in New York City, is operated in Cambridge, where bread and cake are produced.

The F. T. Woodman Company has capital of $40,000 and employs 100 men and women in the manufacture of men's underwear and nightwear. Frank T. Woodman is president, Jacob Roth, treasurer, and John W. Priestley, secretary and assistant treasurer.

CHAPTER XXXV

SOMERVILLE

CITY OF AMAZING INDUSTRIAL DEVELOPMENT

In 1842, less than ninety years ago, when Somerville was incorporated as a town, it numbered but 1,013 souls, and had a total property valuation of less than $1,000,000, with one solitary factory, which had been erected in 1838 by the Milk Row Bleachery Company capitalized for $50,000.

In 1927, with a population of more than 100,000, and a property valuation in excess of $125,000,000, its 145 manufacturing establishments produced commodities valued at $63,790,597. Three-sevenths of the increase in population have been acquired in the last quarter century, and seventy-five per cent of the industrial plants have been located in the city since 1900.

Few cities in the East have had a greater industrial growth during the first quarter of the twentieth century.

Incorporated in 1842, Somerville remained a strictly industrial community until about 1900. Even as late as 1880, a Middlesex County historian made no mention of the existence of any manufacturing enterprises in the city. In seven short years the value of its products increased more than 25%, rising from $45,378,436, in 1921, to $63,790,597, in 1927, and the number of industrial establishments increased in that period from 130 to 145.

While the leading industry is the wholesale slaughtering of animals and the packing of meat, which branches accounted for $35,437,646 of the total value of the local products of 1927, the city is the seat of large food purveying concerns, especially those dealing in bread and other bakery products.

It also has numerous brass, bronze and copper producing enterprises, soap manufacturers, textile plants, wood working concerns, clothing, and other units, whose production in 1927 amounted to more than $20,000,000.

AMERICA'S OLDEST FINISHING PLANT IS IN SOMERVILLE

When or where the first finishing of cotton piece goods was done in the United States is probably an unknown record. In 1801 the Middlesex Bleach, Dye & Print Works was started, in what was then a part of Charlestown, and was known as the Milk Row Bleaching & Dyeing Company, as the street in front, now Somerville Avenue, was then called Milk Row. It was over this road that the farmers brought their milk into Boston, and it was past here that the British troops marched on their way to Lexington and Concord, in 1775.

At the outset, the only work was plain dyeing and bleaching of cotton piece goods. Whether the plant was a corporation, or a partnership, the records fail to show, but in 1819 it was incorporated as the Charlestown Bleachery, and business was carried on under that name until 1842, when Somerville was set off from Charlestown, and the name was then changed to the Somerville Bleaching, Dyeing & Calendering Company.

Shortly afterwards, the corporation was dissolved, and the plant be-

came the property of James Lee, Jr., and the name was changed to the Middlesex Bleachery & Dye Works, and he was its owner until his death in 1878.

In the early '60s, Peter Reed, the superintendent, and Henry Barry, the agent, left the plant and removed to Passaic, N. J., to start the Reed & Barry plant, the nucleus of the present United States Finishing Company.

Kelsey M. Gilmore entered the Somerville plant as a boy, in 1857, at the time the first printing machine was installed. On the death of James Lee, Jr., Mr. Gilmore, with John Haigh, the foreman printer, and Samuel Knight, took over the plant and since then it has been carried on as a firm, and so far as known is the oldest finishing plant in the United States. In 1896, Mr. Gilmore became the sole owner of the plant, and upon his death, in 1909, his son, George L. Gilmore, assumed sole ownership.

In 1863 the plant was burned, but was immediately rebuilt and again in 1884 a fire set by sparks from the Boston & Maine Railroad, destroyed about half of it. Inside of three months it was rebuilt.

The plant employs about 175 hands and the concern maintains a New York office at 350 Broadway.

CONANT BROTHERS COMPANY

Located in Somerville is a concern where history goes back to 1825 when William Conant established in Mount Vernon, N. H., a successful business in the manufacture of hand mirrors. The little red shop, with its hand-made clapboards, and in which most of the townspeople found employment, including the five sons of the founder, each of whom served an apprenticeship as had their father before them, is still standing, in Mount Vernon.

In 1856 three of the founder's sons came to Boston, and formed the firm of A. Conant & Company to manufacture framed mirrors. A fourth son started the firm of Bragg-Conant & Company, with H. H. Bragg, in Milford, N. H., and its success encouraged the partners to remove to Boston, in 1860, and engage in competition with A. Conant & Company.

In 1892 the two firms incorporated as Conant Brothers & Bragg Company, which a few years later became Conant Brothers Company upon the retirement of Alonzo W. Bragg, son of H. H. Bragg.

In 1909 new factories were built in Somerville to which city the concern removed January 1, 1910. Fifty hands are employed. William C. Conant, who became active in the business in 1884, succeeded his father as president of the concern, and in 1908, John B. Conant, a graduate of M. I. T., 1900, became associated with the company, both being of the third generation of manufacturers. The Conant line of bathroom accessories is known throughout the United States and abroad.

THE SOMERVILLE IRON FOUNDRY

About 1860 William R. Bradford, of Charlestown, established the Somerville Iron Foundry, operating it until 1881, when it was purchased by S. B. Locke & Company. In 1896 that firm was succeeded by Messrs. Mildram & Reed, and five years later that partnership was dissolved, and N. H. Reed & Son built a new foundry, at 88 Washington Street, where the business is still carried on. In 1916 the Somerville Iron Foundry Company was incorporated by Nathan H. Reed, Nathan P. Reed, and Michael D. Bingham. The present officers are M. D. Bingham, president, and

N. P. Reed, vice president and treasurer. The concern makes a specialty of iron work for builders, has capital of $50,000, and employs forty operatives.

LOMBARD & COMPANY, INC., ESTABLISHED IN 1827

In 1924, Lombard & Company, Inc., established in 1827, and manufacturers of pulp stones since 1867, occupied its new factory, in Somerville. Until after the Civil War, when sails were largely driven off the ocean by steamships, the Lombard concern was exclusively engaged in operating vessels to the Carolinas, the Far East, and Europe. Finding the shipping business unprofitable as the result of the changed conditions and because the company had carried many cargoes of grindstones, its officers turned to this line of production, and established its own quarries.

When the ground pulp wood industry was introduced, the company naturally became interested in stones for this industry, and it was soon learned, by a process of elimination, that the best came from England.

The first stone supplied to the pulp trade was in 1868, and in a very few years, the most promising sources of supply were definitely determined. Eventually the company established its own quarries in England, and while this branch of the business has become more and more important, a few of the old time connections were retained up to the beginning of the World War in 1914. At that time Lombard & Company were the largest importers of Turkish emery ore and Turkish dried fruits on the Northeast seaboard. Raisins and spices were also handled in quantities, and the wholesale grocers throughout the northeastern part of the country knew Lombard only as importers of Eastern products, particularly dried fruits. The company operates a branch in Montreal, Canada.

When it erected its model factory in Somerville, the company's officers entertained many misgivings on the occasion of its occupancy, as it seemed as if the concern was moving a long way from the heart of the city, and into a community where there was practically no manufacturing; in fact, nothing but acres upon acres of marsh land. Shortly after the factory was completed, Henry Ford purchased thirty acres of land directly across the state road for the purpose of establishing his eastern assembling plant, upon which he expended $4,000,000. Within a year after the company located in Somerville, practically all the land around its factory had been sold and buildings erected thereon.

William H. McGill is president and treasurer, and Walter L. McGill, secretary, of the corporation, which has capital of $250,000.

THE MOULTON LADDER MANUFACTURING COMPANY

The old adage that "necessity is the mother of invention" finds added proof of its authenticity in Somerville, where, for nearly a century there has been carried on without interruption the manufacture of ladders.

In 1839, a Universalist Church was erected on Gore Street in East Cambridge, by Elijah Spare, a native of Vermont, who found in the course of building the structure a very pressing necessity for ladders, but upon investigation he could not discover a source in New England where he could obtain these essential devices.

Upon completion of the edifice, he determined to remedy that situation, and in the fall of 1839, he erected the first exclusive ladder industry in the United States.

In 1869, he was succeeded by C. W. H. Moulton, who carried on the

business on the same site until 1903, and thus ladders were made at this pioneer factory for sixty-four years.

In 1903, a larger plant was erected in Somerville, to which C. W. H. Moulton removed, and where he continued the business until his death, in 1923, when he was succeeded by his son, F. H. Moulton.

In October, 1928, the Moulton Ladder Manufacturing Company succeeded the old firm, and F. H. Moulton became president of the new corporation. The factory and equipment have been enlarged to take care of the increasing demand for the products.

The old and new units created the first extension ladder, the first successful extension trestle, and, in fact, practically every improvement in ladder staging for the painting industry has been evolved by the Somerville concern. The Moulton Ladder Company, of Philadelphia, handles the Moulton products exclusively.

Today, the commodities of the Somerville corporation include ladders, stepladders, trestles, extension trestles, platform stages, falls, wall brackets, spreaders, shingling brackets, bunters, roof boards, patent fenders, New York triangles, common triangles, ladder jacks, hooks for ladders, roofs, gutters and cornices, window jacks, clothes dryers and horses, ironing tables, skirt boards, hygrade shoe racks, and hygrade casters.

The corporation employs 100 operatives, and has a Boston sales office at 151 Portland Street.

TWO OLD SOMERVILLE ENTERPRISES

The American Tube Works, whose main headquarters are at 10 Oliver Street, Boston, has carried on the manufacture of seamless brass and copper tubes, at its factory in Somerville, since 1851. The concern has capital of $1,165,000, and employs 500 operatives. Walter B. Grant is president and assistant treasurer; John J. Dervan is treasurer.

The Union Glass Company was organized in 1854, and is now capitalized for $200,000, the concern manufacturing glassware and employing upwards of 200 operatives. Julian de Cordova is president, and Charles H. Glazier, treasurer and general manager.

The Derby Desk Company was organized in 1881 and the Eagle Shade Roller Company came into being the same year.

BRICK BROTHERS

In 1889, Albert Brick, then twenty-five years of age, and the son of William Brick, of Manchester, England, a pioneer inventor of labor saving machinery, which was applied to the processing of fabrics in bleacheries and print works, and which displaced the employment of children of tender years in these plants, erected a factory in Somerville, and began the manufacture of textile finishing and dyeing machinery, for bleacheries, print works, worsted and woolen producers, dyers and finishers, and later for the finishing and dyeing of silk and plush. Extensions followed, as in addition to producing the inventions of his father, which are still manufactured at the works established by the latter at Lower Broughton, in Manchester, England, the younger Mr. Brick not only adapted and perfected them to meet American demands, but invented scrutchers for opening and guiding fabrics in bleacheries, print works, and woolen and worsted mills, angular girders, conical openers and the practically universally used continuous crabbing machine, which revolutionized the process of finishing cloth in worsted plants.

He also invented and patented an open width vacuum extractor for

removing liquor from cloth in the open state, which superseded the former method of extracting the effluent in a dangerous centrifugal extractor where the fabric was doubled, folded and creased, and otherwise maltreated.

Mr. Brick is the inventor of the well known coronation piece end sewing machine set on the American style stand, which has been copied by mill sewing machine makers throughout the world, and which executes a flat chain stitch that can be easily withdrawn when required. He also originated, invented and manufactures continuous scouring, washing and dyeing machines for pile fabrics, and practically all the plush made in this country is finished on these devices.

Washing, limeing, singeing, dyeing, padding box dyeing, dampening, batching and angle machines, for bleacheries and print works, squeezers, dye jigs, open and rope soapers, scroll and chain openers, expanders, mangles, color strainers, vacuum valves, reels, expanding pulleys, and all kinds of rollers, constituting the products of Brick Brothers in the textile finishing and dyeing fields, while dyeing, warp dyeing, steam finishing, steam blowing, tacking, tentering, and shrinking machines, and dye kettles, are manufactured by the concern for woolen and worsted dyers and finishers.

Associated with Albert Brick in the Somerville Machine Works, solely owned by him, are his two sons. The father is the descendant of a family of artisans and inventors whose mechanical lineage goes back to almost prehistoric times, and the Somerville Machine Company traces its business to the year 1764, when an ancestor founded it in England. Mr. Brick attributes the success he has achieved not to any God-given genius that may have been imparted to him, but solely to hard work, strict attention to business, honesty of purpose, and a material inclination to give the best that is in him.

Frederick E. Hollins and George Heintz formed the Boston Burial Case Company in 1900, which, in the intervening years has grown to occupy eight times the space originally required for manufacturing. The concern employs fifty operatives and produces burial cases and funeral supplies.

THE NORTH PACKING & PROVISION COMPANY

The North Packing & Provision Company which today has capital of $3,000,000, is one of the old-established enterprises of Somerville, its local plant covering more than thirteen acres, employing 1,200 hands.

The slaughtering and packing industry reigns today as the dominant manufacture in Somerville, and the four concerns operating in the city employed, in 1927, 2,150 of the total number of 5,500 industrial wage earners in the city, used stock and materials that year valued at $31,085,906, paid wages amounting to $2,734,592, and the value of the products in these lines was $35,457,646.

THE COMING OF THE FORD MOTOR COMPANY TO SOMERVILLE

Locating an assembling plant at Somerville, in 1926, with an initial capital investment of $4,000,000, and the employment at the outset of 2,500 hands, the Ford Motor Company of Detroit, Mich., gave evidence of its belief in the future industrial possibilities of Massachusetts.

The plant was formally opened on March 9, 1927, when several thousand persons were invited by the management to inspect operations, and during that week open house was maintained, affording visitors an oppor-

tunity to observe in action the series of conveyors, the self-dipping enamel ovens, the body ovens, the pyroxylin spray booths, the glass grinding machinery, the body building equipment, the upholstery work, and all the processes of assembling cars.

They marveled at the chain of conveyor systems which coordinates all the varied operations and gains time through the coordination of effort, and which is so minutely timed as to meet the pace of what is denominated by the Ford management as the "final assembly line," 769 feet, or almost a seventh of a mile in length. Upon it each car grows from four pieces of channel iron, comprising the frame, to the complete running automobile which finds the customer's representative or dealer waiting for it at the completion of the assembly.



FRONT VIEW OF THE $4,000,000 FACTORY OF THE FORD MOTOR COMPANY, ERECTED ON THE SOMERVILLE WATER FRONT, IN 1927

They were impressed by the simplicity of the arrangement of the stock of raw materials; by the handling of the same, as well as by the system employed in the unloading and loading of freight cars on the tracks which run the entire length of the main building, and which are under cover from the time of their receipt until their departure.

During the open house week one of the Ford aeroplanes brought to the Somerville plant from the Detroit factory, an unassembled Ford roadster.

The factory has a capacity of 400 cars every eight hours, and contains 340,000 square feet of floor space. The building embodies the latest idea in one-story structures, and was designed distinctly for the purpose of combining industrial economies and healthful working conditions. It is 1,130 feet in length, divided into twenty-six bays, and is 301 feet wide, divided into seven bays, giving a clear span of 40 feet per bay for working operations. It is 14 feet to the bottom of the trusses, and an additional 16 feet to the gable of the Pond type roof, and with the exception of the office and show room, the structure is one story high throughout.

In the roof and walls are upwards of 79,000 feet of glass, equal to nearly fifteen miles, and approximately 100,000 pieces of tile slab were required in building the roof.

The assembling of 100,000 cars a year at Somerville calls for machine work of extreme accuracy, and master gauges of precise measurement, the Johannson gauge block, a Ford product, and the famous conveyors, developed with the idea of bringing the work to the operator, constitute a part of the plant equipment. One conveyor runs through a mammoth oven, where fenders, hoods, shields, and similar parts are enameled by the automatic dip process at a rate of enough for fifty cars per hour. The loading of each tank requires 6,000 gallons of enamel, and each is

equipped with automatic, foam fire extinguishers, which protect it instantly in case of fire, and a pump with which the tank system is equipped can empty all tanks within ten minutes, discharging the enamel into tanks in the oil house, this process being resorted to at least once every eight hours, where it is twice strained, and returned to the dip tanks, thus insuring perfection in the enameling operations.

External industrial oil burning heaters bring air to a temperature of from 500 to 550 degrees Fahrenheit, which is blown into the ovens to insure even heating of the cross sections, and to conserve space, the heating equipment is located below the ovens.

Thirty thousand square feet of floor space at the Somerville plant are devoted to service stock requirements, this department constituting a distinct commercial business in itself, all Ford dealers being required to carry a sufficient stock of parts to service the cars in their territories with a stock turnover of approximately ninety days. This department supplies the 340 sales dealers in New England with parts for the approximately 500,000 Ford cars registered in the six northeastern states.

The powerhouse at Somerville is a separate unit from the assembly plant, and has an elevated floor and another on a sub-level, where is generated the power for operating all rotating machinery in the main building, as well as charging 300 storage batteries each day, and in providing steam used in heating the plant, the ovens and hot water for the washrooms.

The three steam boilers are of the inverted V-type, rated at 500 horsepower each, with a capacity of 200 per cent rating, giving approximately 3,000 horse-power, and are operated by oil and equipped with burners designed and built by Ford engineers and mechanics. There are three sets of turbo-generators, each of 5,000 kilowatt capacity, running at 6,000 revolutions per minute, used in producing electricity and requiring 225 pounds pressure of superheated steam, and can be operated by condensing the steam or by permitting the steam to exhaust into the heating system.

When, in 1925, it was decided to replace the assembly plant in Cambridge by erecting a new building, many overtures were made to the Ford officials to locate the enlarged plant at points other than Somerville, but the facilities were so excellent on the water front there that a decision was made to acquire acreage in that city. In order to secure stable foundations it became necessary in some places to drill to a depth of about forty feet. The erection of the structure and the installation of the equipment required over a year, and Somerville is proud that it became the locale of one of the finest automobile assembly plants in the United States.

GORDON BROTHERS

In 1912, Max, Morris and Jack M. Gordon began the manufacture of children's creepers, dresses, boys' suits and play suits, on Bennett Street, Everett, with twenty machines, and two years later removed to larger quarters, in Malden, where production was carried on until 1917, when the firm turned over its entire plant to the War Department, and made shirts for the U. S. Government.

In 1918 a branch plant was acquired in Cambridge, where thirty machines were installed, and three years later the Malden plant was joined with the Cambridge factory, additional space being acquired in the latter city, at that time.

In 1926, the firm moved to its present location on Beacon Street, Som-

erville, where about ninety machines are operated, and where upwards of 100 hands are employed.

The company's commodities are registered in the U. S. Patent Office as Togland Products, and every garment is packed in a glassine sanitary envelope, and the goods are marketed throughout the United States to wholesalers, or chain and department stores.

THE CINDER CONCRETE UNITS CORPORATION

A new industry for this section of the country—the manufacture of cinder concrete blocks, was started, in 1928, by the Cinder Concrete Units Corporation, which completed a $250,000 plant on the Mystic River in Somerville, near the new factory of the Ford Motor Company. While this is a complete plant in itself, it really is but one unit in what may be a much larger group of buildings, provided business increases as expected.

The corporation acquired about six-acres of land of the Boston & Maine Railroad, with spur tracks leading directly to the buildings.

Seven or eight carloads of cinders are delivered by the Boston & Maine every working day and cars are taken alongside the crusher. Dredge-type shovels unload the cinders and dump them where they are taken up on the conveyors. The cinders are crushed and screened to remove the dust, and are graded according to size. They are then carried automatically to the large silo-type storage bins, which care for the different sizes of cinders. Another bin is used for the concrete, large quantities of which are handled daily.

A system of conveyors takes the cement and cinders to steel containers above the press and moulds and weighs the proper amounts of materials for each block before depositing it into the mixer and moulds below. The press is a massive affair and compresses the blocks under great pressure. The moulds may easily be adjusted for any size or shape of block that is offered.

Once the blocks have been pressed they are taken on trucks that run on narrow-gauge tracks to drying rooms and are kept there for hours. Live steam is employed and is maintained at 125 degrees temperature. Later the blocks are again put on trucks and trundled to the yard, where they are piled up and allowed to season for about a month.

When the blocks are first pressed they are black, but when finally seasoned, they are a bluish gray. Some are finished rougher than others, to meet the varying demands of contractors.

One of the chief virtues of these cinder blocks is claimed to be their lightness, a factor which enables the man who lays them to handle them easily and quickly. It also is a material factor in lightening the load that must be carried on large construction jobs. The blocks are fireproof and are so hard as to absorb practically no moisture.

While new in Boston, cinder concrete blocks are being used largely in New York, Detroit and other cities.

THE AGAR MANUFACTURING CORPORATION

In 1929, the Agar Manufacturing Corporation, which built a plant two years before, at the foot of Clyde Street, at Somerville Junction, when it removed from Medford, was enlarged by an addition of 260 feet long, 50 feet wide and 35 feet high.

The corporation manufactures corrugated fibre shipping containers, has capital of $260,000, and employs 150 operatives.

C. A. Agar is president, W. K. Bruckhauser, vice president, W. J.

Sharp, vice president and general manager, and H. W. Ford, treasurer and secretary.

OTHER INDUSTRIES OF SOMERVILLE

The Somerville Knitting Company, owned by Henry and David Grieve, manufactures men's, women's and children's sweater coats and bathing suits, as well as knitted trimmings for coats, thirty hands being employed.

The Cambridge Color & Chemical Company, owned by William T. Beattie, is engaged in the production of dyes and finishes, and employs twenty operatives.

On January 1, 1929, the Spray Engineering Company, and the Spraco Painting Equipment Company were consolidated under the name of Spraco, Inc., and new offices and factory facilities were established at 114 Central Street, where Spray cooling systems, air and gas washing and cooling and irrigation equipment, self-cleaning strainers, indicating flow meters, spray nozzles, industrial finishing equipment, and painting automotive and miscellaneous equipment are produced. Wayne B. Thompson is president; Frank G. Dennison. vice president, and William F. MacDonald, treasurer.

The Johnson Baking Company, owned by John M. Milne, manufactures ice cream cones and doughnuts, and employs twenty-five operatives.

Underhill Brothers, owned by R. E. Underhill, produce edge tools, and employ twenty-five operatives.

The New England Vinegar Works, Inc., capitalized for $175,000, is engaged in the production of vinegar and cider, and employs twenty-five hands. A. E. Rowse is president, and A. E. Rowse, Jr., treasurer of the corporation.

The American Metal Polish Company, of which Frank R. King is president and Noble S. Butt is treasurer, is engaged in the manufacture of metal polish, and has capital of $50,000.

C. W. Babcock & Son employ twenty-five operatives in the production of paper boxes. F. C. Babcock being president and treasurer.

The Bailie Wickercraft, of which William Bailie is president and treasurer, and M. G. Seymour, secretary, employs fifty operatives, in producing wickerwork.

The Boston Pen Company employs twenty-five operatives in the manufacture of gold pens, Charles Brant being president, and Charles Edward Brant, treasurer, of the corporation.

The Box Craft Company, capitalized for $50,000, employs seventy-five operatives in the manufacture of paper boxes, Edgar E. Abrahams being president and treasurer, and Charles H. Gilmore, secretary.

The main plant and headquarters of the Bushway Ice Cream Company are located in Somerville, branch units being operated in Woburn and Framingham. The concern employs 150 hands in the production of ice cream and ices. J. Howard Bushway is president, Francis S. Cummings, secretary, and John Colgan, treasurer of the corporation, which has capital of $250,000.

The Philip H. Butler & Son Company, with capital of $100,000, employs seventy-five operatives in the production of marble, soapstone and slate. P. H. Butler is president and treasurer, Merrill P. Butler, vice president, and Joseph B. Merrill, secretary.

At its West Somerville plant, M. W. Carr & Co., Inc., capitalized for $200,000, employs 200 hands in the manufacture of metal novelties. Fred M. Carr is president, W. C. Carr, secretary, and E. P. Carr, treasurer.

The Continental Optical Case Company, whose headquarters are at 2 West Forty-sixth Street, New York City, operates a plant in Somerville, where optical merchandise is manufactured. William P. Hall is president and Wm. C. Haueisen, treasurer.

The Davenport-Brown Company, with capital of $125,000, employs sixty operatives in the production of woodwork. William I. Brown is president, M. M. Haugh, treasurer and secretary, and D. E. Nickerson and O. Levine, vice presidents.

The Peter Forg Manufacturing Company employs fifty hands in the manufacture of sheet metal stampings. The concern has capital of $50,000, and Herman Forg is president and treasurer, and Fred Forg, secretary.

The Garhart Dental Specialty Company, with capital of $50,000, produces dental alloys and cements. N. K. Garhart is president, John H. Carey, secretary, and H. I. Sheerin, treasurer.

The H. M. Hillson company employs 100 men in the manufacture of galvanized tin and sheet metal bars. The corporation has capital of $150,000. A. Rosenberg is president, and G. I. Hillson, treasurer.

The Horton & Hubbard Manufacturing Company is engaged in the manufacture of dress suit cases, and employs forty operatives. The company has capital of $35,000. A. Caro is president, Herbert J. Munroe, secretary, and Walter E. Horton, treasurer.

The Jerguson Gage & Valve Company employs seventy hands in the production of water gages and valves, Philip A. Jerguson being president and treasurer, and E. D. Grinnell, secretary.

The Johnson Marble Company, with capital of $250,000, produces interior marble finish, and employs seventy-five operatives. Thomas J. Johnson is president and treasurer, and A. P. Newman, secretary.

E. F. Kemp employs fifty hands in the manufacture of salted and chocolate covered nuts.

The James A. Kiley Company, a partnership made up of James A. Kiley, John T. Kiley, and Albert J. Kiley, employs fifty hands in the manufacture of automobile truck bodies.

The Marden-Wild Corporation, with capital of $150,000, employs twenty-five operatives, in the production of industrial oils and cod liver oil, P. F. Wild being president, Thomas R. Aldrich, vice president, W. D. Morton, secretary, and Fred M. Chipman, treasurer.

The New England Bakery Company, whose New York office is at 285 Madison Avenue, is engaged in producing bakery products.

The New England Cabinet Making Company, Inc., owned by S. Waldman, employs thirty-five operatives in producing Colonial furniture, and has capital of $25,000.

The F. H. Newton Company, of Cambridge, operates a branch plant, in Somerville, where woodworking operations are carried on.

The Norton Tallow Company, of which Arthur F. Mason is president and treasurer, manufactures soap and employs twenty-five operatives. The concern has capital of $72,500.

The Oakes & Dow Co., Inc., with capital of $205,000, produces sootless spark plugs, Albert T. Dow being vice president, Wm. W. Oakes, secretary, and Charles W. Dodson, treasurer.

The Paper Goods Company, whose headquarters are at 210 State Street, Boston, manufactures paper specialties at its Somerville plant, where sixty

operatives are employed. Edgar E. Abrahams is president and treasurer, and Charles H. Gilmore, secretary, of this $200,000 corporation.

The Randolph Paper Box Company and the Sealright Company, Inc., which also carry on business, in Somerville, are subsidiaries of the Paper Goods Company.

The Ryan-Cushing Company, capitalized for $50,000, is engaged in the manufacture of fancy leather goods. Dean S. Cushing is president G. M. Garrity, secretary, and James A. Ryan, treasurer, and fifty hands are employed.

The Somerville Baking Company, of which Duane F. Phelps is president and Brayton Campbell, treasurer and secretary, manufactures bread and pastry.

F. LeRoy Kelley is the sole owner of the Somerville Brush Company, Inc., which is engaged in the production of brushes.

The Somerville Machine & Foundry Company has capital of $95,000, and employs fifty hands in the manufacture of brass and aluminum castings and accessories. F. G. Volpe is president and treasurer, and R. B. Bonner, secretary.

The Sprague-Hathaway Manufacturing Company, capitalized for $30,000, employs 100 operatives in the manufacture of picture frames and photographic enlargements, Donald E. Wallis, being president and treasurer, and J. R. Thonet, vice president.

The Standard Charcoal Company, of which John J. McCarthy is president and treasurer, operates its main plant in Somerville, and branch units in Waltham and Stoneham, in the production of charcoal.

Wickham & Roe, a partnership made up of Henry D. Wickham and Minnie W. Roe, employs fifty hands in the production of baked products.

CHAPTER XXXVI

NEWTON

HOME OF TEXTILES AND TEXTILE MACHINERY

Newton Upper Falls early became the habitat of industry, when in 1688, John Clark, of Watertown, erected a sawmill at the upper end of the rapids on the Charles River, where there was a natural fall of twenty feet, while Newton Lower Falls, two miles farther down the stream, was the site of most of the mills, on the Newton side of the river.

In 1695, the sawmill site passed into the hands of Clark's sons, John, Jr., and William, who established a fulling mill there.

In 1703, John Hubbard erected an iron work, whilst paper-making and the manufacture of silk and silk hosiery followed. It was at Nonantum or North Village, where David Bemis, in 1760, constructed the only "rolling dam" in the United States, and where he became a successful paper manufacturer, later turning cotton textile producer, building, in 1812, a gas plant, and employing gas two years before it was made and used in England.

In 1771, Thomas Parker built a scythe factory on the river, and in 1788, Gen. Simon Elliot, of Boston, purchased a part of the Clark water privilege, and erected a snuff mill. In 1809, Jonathan Bixby acquired a water privilege on the river to turn grindstones, and five years later there were clustered on the stream four snuff factories, a grist mill, a screw factory, a wire mill, an annealing house, and a blacksmith shop, all of which General Elliot sold, with the power privileges, to James and Thomas Perkins, of Boston, who planned the erection of a textile factory, to be equipped with 6,000 spindles, for the manufacture of sheeting. A change in the Federal tariff policy put a quietus on the enterprise, and it was not until 1823 that the Elliot Manufacturing Company was incorporated to make cotton goods.

Iron works, saw, grist, snuff mills, leather factories, calico printing works and machine shops were included in Newton's earlier industrial enterprises, and a paper mill was erected by John Ware, of Sherborn, at Newton Lower Falls, about 1790, the manufacture of that commodity being carried on in the city until about 1900.

In 1822, Jesse Fewkes built a small factory, where he manufactured silk and linen laces. Experiencing difficulty in securing raw silk, due to the slow transportation facilities of the period, he attempted to introduce the silk worm and the mulberry tree into the Massachusetts climate, but like similar experiments in Northampton, Nantucket, and elsewhere, the enterprise failed.

THE SACO-LOWELL SHOPS

Ignorance of English inventions, the difficulties attending transportation in the early days and the lack of skilled workmen were some of the problems that stared Otis Pettee in the face, when he came to Newton Upper Falls, from Foxboro, more than a hundred years ago, to assume charge of the construction of the plant and the machinery to be installed

in the cotton mill of the Elliot Manufacturing Company. The same condition prevailed there that had been met in Waltham by Francis Cabot Lowell and his associates, as the new company was forced to build its own machinery and its own machine shop.

Pettee, the son of a blacksmith and gunsmith, had been reared in the atmosphere of the forge, and brought with him the inheritance of the paternal skill and interest in mechanics contributed by his father. It is related that during his childhood he accompanied his father to a grist mill where a carding machine had been installed, and when the time came to return home the young man was missing and was found intently engaged in making an examination of the device, which so fascinated him, that he declared long afterwards that he could have reconstructed it from his memory of that cursory inspection.

At nineteen years of age, young Pettee was employed in a small factory, in Foxboro, and five years later, in 1819, he was called to Newton to assume charge of a cotton mill established there by Rufus Ellis.

But with his advent into the affairs of the Elliot concern impetus was given him to carry out his life work, and immediately after he completed and installed the machinery in that cotton mill, he began turning out orders for Lowell, Waltham and Dedham cotton concerns, and finally one for the Jackson Company, of Nashua, N. H., which proved to be the turning point in his career. The directors of the Elliot concern, not being practical mechanics, reached the conclusion that the large contract received from the Nashua Company could not be completed within the specified time, voted to cancel it, whereupon Pettee assumed all the responsibility, and finished the work so satisfactorily that he was presented, in 1831, with a silver service by the New Hampshire corporation.

The friction between Pettee and the officers of the corporation finally reached a point where the Elliot concern decided to discontinue the manufacture of machinery, and to dispose of the machine shop and equipment.

Pettee bought twelve acres of land, at $100 per acre, on the bank of South Meadow Brook, a tributary of the Charles River, constructed a 25-foot dam, and erected a workshop, forge and water wheel, equipping his plant largely with machinery he bought from the Elliot concern. The little shop, the germ of the later extensive establishment, was 69 by 27½ feet in dimensions, and three stories high, and at the outset much of the work was done by hand, steam power as an auxiliary to the water wheel not being introduced until 1838. On March 28, 1834, Pettee had been granted his first patent on a double speeder, or double arm flyer, a "new and useful improvement for producing any required change in the velocity of machinery while in motion," which was pronounced by Professor Readwell, a famous philosopher and engineer of the period, as being "absolutely perfect, having its principles eternal, it could not be improved." Although a bit overdrawn the statement proved true for at least a quarter of a century during which the invention found a place in all cotton mills, and even today it is still in use in some machines, being the predecessor of the welded, pressed steel flyer today produced by the Saco-Lowell shops.

In 1837, Ithamar Whitin, a native of Dover, then living in Mexico, gave to Pettee an important order for machinery to be installed in a cotton mill in that country, and almost immediately he provided equipment for new mills about to be erected in Durango, Santiago, Coluna, and several other cities in Mexico, sending in addition experienced machinists and cotton spinners to install and operate his machinery. The demands

of New England and Georgia mills led to the continued expansion of Pettee's plant, but in the height of his prosperity fire completely destroyed the enterprise on November 25, 1839, with a loss of $100,000, upon which the insurance was but $20,000. Undaunted, he promptly rebuilt, and when, in 1840, the Elliot Manufacturing Company decided to liquidate its cotton mill, Pettee welcomed the opportunity to purchase it and promptly installed 250 looms, remodeled the units, and built up the concern until it became the largest producer of cotton cloth in New England.

After his death, in 1853, when but fifty-eight years of age, the industrial properties were purchased by his sons, Otis and George Pettee, and his son-in-law, Henry Billings, who formed a partnership, which continued until January 1, 1880, under the name of Otis Pettee & Company. Billings bought the business and carried it on under the old name until January, 1882, when a stock company was organized, with $200,000 capital, under the name of Pettee Machine Works.

This change came at about the time a revolution was in progress in the cotton carding machinery field. In 1885, the Nashua and Jackson mills tried a new type of English revolving flat cards, which proved so satisfactory that the Amoskeag mills ordered a number for the then new Jefferson mill.

The directors of the Pettee Works determined to meet the new demand, and sent representatives abroad to investigate the different patterns, and upon receiving their report determined in favor of the flexible bend type, which the Newton concern decided to manufacture. This program demanded courage and was contrary to the conservative opinion expressed by many who were consulted. It meant the scrapping of a vast amount of old machinery in the plant, and the installation of expensive new equipment, but time justified the experiment, and the first cards of the new type were delivered to the Jackson Mills about the end of 1887, and one which operated in that plant for 33 years is now shown in good condition in the experimental room of the Saco-Lowell Shops, at Newton.

Previous to 1890, the output of the Pettee concern included a variety of machinery such as cards, drawing frames, railway heads, speeders, roving frames, and looms, but the success of the revolving flat card business led to concentration on the construction of cards, drawing frames and railway heads, in the development of which L. W. Penney has played no insignificant part during his active career of more than fifty years with the company.

In 1893 the wooden foundry was superseded by a brick structure, with a capacity for melting fifty tons of iron ore per day, while in 1895, the main building was supplanted by a brick structure three stories in height, covering an area of 400 by 75 feet, and equipped with all modern appliances.

In the latter year molding by machinery was investigated and the idea, then a novelty, was adopted after a period of experimentation, and ultimately was applied to practically all patterns, the Newton unit being the first in the United States to introduce the system.

In 1897, the Pettee Machine Works were merged with the Saco Water Power Machine Shop, of Biddeford, Me., under the name of Saco-Pettee Machine Shops, a consolidation which enabled the two units to completely equip a cotton mill with all necessary machinery up to the looms.

In 1899 the plant was again enlarged by the erection of a building 800 by 75 feet, three stories in height, while a new foundry was constructed at the same time, 400 by 200 feet, which operates day and night.

In 1912 came the major consolidation of the Lowell Machine Shop, the Kitson Shop, and the two units of the Saco-Pettee Machine Shops, under the name of Saco-Lowell Shops.

In 1920 a modern foundry was built at Newton, embodying the most advanced ideas in factory construction, and equipped with labor-saving devices, such as electric monorail carriages, sand handling machinery, and other features.

The Newton works have thus grown since 1887 from a plant covering a total area of about 130 square feet, with a foundry capable of melting 7½ tons of iron per day, and employing 175 men, to a plant covering an area of 133,000 square feet, with a foundry melting 60 tons of iron a day, and employing 1,100 men.

The Saco-Lowell Shops as a whole occupy some sixty-two acres of manufacturing space, and employ 6,800 men, being the largest builder of textile machinery in the United States, and an important competitor in foreign markets. The concern was the first to establish southern offices, and for twenty-four years has maintained at Charlotte, N. C., a shop for repairing and reclothing cards, and more recently a general repair shop in the same city.

It maintains an experimental room at Newton and a research laboratory, at Lowell, and it seems safe to predict that scientific research offers bright prospects for the future and is likely to bring about improvements which may perhaps equal or even surpass those of the nineteenth century.

For a full half century the Saco-Lowell Shops have been exporting textile machinery to various countries throughout the world.

The action taken in 1928 by the directors of Saco-Lowell Shops in closing one of the two units in Lowell—that formerly known as the Lowell Machine Shop—and consolidating operations in the three remaining plants —the Kitson Machine Shop, at Lowell, manufacturing opening and picking machinery; the unit at Newton Upper Falls, producing cards and drawing machinery, and the Biddeford, Me., plant, manufacturing spinning, roving and twisting machinery—in no wise affected production in the two remaining Massachusetts plants other than to augment the same, as the miscellaneous group of minor items in the line of cotton machinery, and the Bradford and French worsted and spun silk machinery, formerly made at the Lowell Machine shop unit, are now produced at the active plants, thus adding to economy and efficiency of operation. The best and most modern part of the Lowell machine shop equipment was transferred to the other plants and the calculations made by the management, based upon a very thorough survey of the company's factories and facilities, indicate clearly that large and permanent savings will result from this program of consolidation and that ability to handle a large volume of business in an efficient and economical way will be greatly strengthened.

In 1928 the Saco-Lowell shops purchased the assets of The Metallic Drawing Rod Company, of Springfield, and transferred production to the Newton Upper Falls plant.

The corporation has capital of $9,000,000 and employs 6,000 hands. David F. Edwards is president, R. P. Snelling, F. J. Hale and Charles E. Rogerson, are vice presidents, R. A. Kettley, is treasurer, Charles E. Cooke, secretary, and Robert Cutler, clerk.

In 1852, Joseph Plimpton erected a factory, at West Newton, for the manufacture of ribbon, and eight years later Isaac Farwell, Jr., built a

plant, at Newton Lower Falls, to carry on the same type of production, removing ten years later to Newton village.

THE GAMEWELL COMPANY

From the cradle to the grave scarcely anything that occurs in our daily life startles us more, or gives us more of a thrill in the dead of night, than to hear the screech of the fire sirens, summoning the firemen of our cities and towns to duty, which almost daily is attended by all the heroics that we commonly attribute only to the battlefield.

The author doubts whether there is a reader aware of the fact that, nine cases out of ten, when he counts an alarm registered upon the fire bells it automatically flows from a device designed, invented, patented, built and installed by Massachusetts men.

But it is an historical fact that during the past sixty-nine years The Gamewell Company, of Newton, has installed over 90 per cent of the fire alarm systems now in operation in over 1,500 cities and towns in the United States and Canada, as well as in many foreign countries, including Asia, England, Germany, New Zealand, Russia, South Africa, South and Central America, India, the Canal Zone, the Philippine and Hawaiian Islands, and the West Indies, and this fact is all the more significant when one contemplates that during this period of time between sixty and seventy competing concerns have come and gone in this field until today the Gamewell unit is the only organization in the world devoted exclusively to the manufacture of emergency signalling apparatus, such as fire and police telegraph systems.

The Gamewell system was invented by Dr. William F. Channing, who was assisted in its development and construction by Moses G. Farmer, one of the foremost electrical engineers of his generation, and in 1861 the Gamewell Company was organized in Newton Upper Falls, where its plant still operates. Today it has an invested capital of $3,250,000, and affords employment to 400 hands.

The company's products are not exclusively used by municipalities, as is evidenced by the Gamewell installations in the Ford plants, the Westinghouse Electric, the General Electric, the Victor Talking Machine, the Pennsylvania Railroad, and countless other leading industrial and transportation companies. Many prominent schools and institutions such as the Central Islip, Willard and Brooklyn State Hospitals of New York, the largest insane institutions in the world, containing several thousand inmates, are also equipped with Gamewell fire and watch systems.

The first fire alarm telegraph system in the world was invented, constructed, and placed in operation in Boston, on April 28, 1852, and it was indeed fitting that in 1925 Boston should again take the leadership upon the completion of the finest fire alarm central office in the world, located almost within the shadow of the factory where all the apparatus installed in the Boston headquarters was produced. When the Hub set up its pioneer system in 1852, it consisted of three box circuits, three bell circuits, forty boxes, sixteen alarm bells, and crude central office apparatus housed in a building which was exposed to serious fire hazards.

The new office, equipped with the last word in apparatus, is housed in a beautiful building, located in the Fenway, a part of Boston's Park System, 250 feet away from the nearest building. The structure is of fire-resistant construction and of sufficient size to take care of the city's natural growth and the possible annexation of surrounding cities and

towns. A special Act of the Massachusetts Legislature was passed giving the city the right to use a section of the Park System for this purpose.

Fire alarm and police signaling systems consist of more than the box observed on the sidewalk. In many respects this work is similar to that of clock making, in fact, many of the Gamewell employees were obtained from the ranks of expert clock and watch makers, and have been in its employ from twenty to forty-five years.

In 1928 the company entered the electrical field through the purchase of the Holtzer-Cabot Electric Company, of Boston, and the traffic field, by acquiring the Harrington-Seaberg Company, of Moline, Ill., thus rounding out its line of products, and enabling it to produce under its management tractional horse-power units, now being used in increasing quantities in signal systems as well as in other industries, special gongs, annunciators, hospital call systems, street traffic signaling devices and a patented advertising sign flasher.

The Gamewell Company also acquired through these purchases a large number of live patents, possessing substantial earning value, as well as the right to applications for additional patents and trade marks then pending. The Newton enterprise has paid dividends uninterruptedly since 1882, and since the incorporation of the concern, in 1924, the rate has been $5.00 per share, per annum.

V. C. Stanley is president and William C. Beck is treasurer of the Gamewell Company, which employs 400 operatives.

THE NATIONAL PACKAGING MACHINERY COMPANY

The Silver Lake Company was organized in 1866 to manufacture silver braided cord, and was capitalized for $80,000. Failing three years later, the concern was reorganized, ultimately having capital of $225,000, and producing window weight, curtain, and other braided cordage, employing 150 operatives.

When the company moved to Georgia a few years ago, the Newton plant was acquired by the National Packaging Machinery Company for an amount in excess of the $150,000 valuation, and 150 workers are now employed there by the new owners.

For years the concern maintained its plant in Jamaica Plain, but increasing business demanded a new location, where larger production facilities were afforded, and the owner, Percy E. Ginn, selected the Silver Lake plant.

SOME OTHER NEWTON ENTERPRISES

In 1867, George E. and William H. Wales, equipped with an old cooking stove, which they set up under the boughs of an elm tree, began to preserve fruit, progressing until they created the Wales Company, with capital of $125,000, which became one of the largest jelly and fruit preserving units in New England. J. P. Snow is president, M. P. Whipple, treasurer, and A. H. Melvin, secretary.

The R. T. Sullivan Company was established at Newton Lower Falls in 1873, and incorporated in 1898, with capital of $150,000. The concern produces wool waste and wool and shoddy, and employs 100 operatives. William P. Sullivan is president and treasurer, and J. E. O'Rourke is secretary of the corporation.

In 1886, an idle cotton factory, at Newton Upper Falls, was purchased, and after being reequipped with machinery, became the home of the present New England Spun Silk Company, which was incorporated in 1920,

when the plant was purchased from William Ryle & Company. Immediately large extensions were made by the new corporation, which has been a material factor in increasing the importance of the United States as a factor in the spun silk industry. The manufacture of this product was not begun in this country until about 1850, but today the industry is producing in the United States about 20 per cent of all the spun silk manufactured in the world. The raw material consists of the waste following the operations of the reeling process of the silk cocoons, of cocoons that are found to be unfit for reeling, and of waste produced in the throwing and weaving of raw silks, most of these materials coming from Japan, China, Italy, and the Near East.

In less than a decade the New England Spun Silk Corporation has become a widely known industry, and is producing high-grade spun silk yarns that are used principally in the manufacture of silk fabrics, such as velvets, plushes, satins (charmeuse) radiums, tub silks, and duvetyns, as well as in the manufacture of knitted fabrics, sewing threads, in the insulation of electric wires, and for the decoration of worsted and woolen fabrics.

Despite the troubles which have obsessed many of New England's textile industries during the past decade, the New England Spun Silk Corporation has operated its extensive plants, in Newton and Brighton, covering about seven and a half acres of floor space, continuously on full time, thus assuring its workers steady work. The fibre is submitted to the preliminary operations of boiling and dressing at the Newton Upper Falls plant, while the spinning and finishing operations are carried on at the Brighton mill. The company ships the bulk of its production to silk weaving and knitting plants throughout New England, New York, New Jersey, and Pennsylvania.

Henri Doll is president, Ivan A. Strohl, vice president, and Jules r. Petitmermet, treasurer.

THE STOWE & WOODWARD COMPANY

In 1888, the Newton Rubber Company was established, later being purchased by the Stowe & Woodward Company, capitalized for $200,000, which has become in the intervening years one of the leading industries of Newton.

Engaged in the manufacture of rubberized fabrics and rubber corner rolls, the corporation now employs upwards of 150 operatives, at its Newton Upper Falls plant. F. R. Woodward is president, and S. B. Ward, treasurer, and they, with E. B. and E. T. Woodward, and D. G. and F. H. Ward, constitute the board of directors.

THE MARTIN MANUFACTURING COMPANY

In 1895 a new industry was born in West Newton—the manufacture of novelty curtains, as distinguished from the type made on the Nottingham machine. Four years later production began in the original plant of the Martin Manufacturing Company, which really was nothing but a shed. In 1905 the concern built its own large and modern two-story brick factory and has become in the intervening years the largest producer of the better class of novelty curtains, maintaining its own Fifth Avenue salesroom, in New York City, and selling through more than a dozen salesmen who travel from Maine to California.

The products are marketed under the patented brand of "Echo Bridge," one of Newton's famous wonders, located at Newton Upper Falls, which

from a utilitarian standpoint is a viaduct through which a part of the Boston water supply runs, but from the historic side is known far and wide because of its unusual attributes. On a day when the air is clear, but when the wind is normal, one can distinctly hear as many as fourteen echoes of the human voice—a most unusual phenomenon.

The Martin Manufacturing Company employs 100 operatives, and has capital of $189,700. George J. Martin is president and treasurer, Wm. H. Donnelly, vice president, Basil Gavin, secretary, and Arthur Adams, assistant treasurer.

Francis E. Stanley takes rank as one of the pioneer manufacturers of automobiles in the United States, having turned out the Stanley Steam car as early as 1897, and upon which he was granted more than fifty patents.

For a quarter of a century steam automobiles were built at the plant of the Stanley Automobile Company until the factory was taken over by Bachrach, Inc.

THE MILLIKEN MACHINE COMPANY

For thirty years the Millikin nailing machines have been in use in the electro plating, photo engraving, celluloid, toy, electrical, aircraft, picture framing and ball-bearing industries, as well as in the plants of other manufacturers using small nails and rivets. Upwards of 3,000 of these machines have been turned out at the West Newton plant of the Milliken Machine Company, owned by C. H. Milliken, thus increasing production from 60 to 200 per cent over hammer hand driving, the devices being provided in bench or pedestal types, and for either alternating or direct current motors.

The corporation also manufactures machine tools, including bench and angle plates, fall turret heads, spring vice jaw clamps, and slide rests, and carries on general machine and experimental work.

Twenty-five hands are employed at the plant.

THE EARNSHAW KNITTING COMPANY

In 1911, the Earnshaw Knitting Company was founded to manufacture infants' garments, under the trade name of Vanta, beginning operations in Chicago, that year, the concern being organized by G. F. Earnshaw, a native of Boston, who placed W. A. Alexander in charge of production, while the founder assumed direction of sales.

Nine years later the company removed to Newton, and while the chief product still remains a series of patented garments which make it possible to provide infants with garments without pins or buttons, all fastenings being of Vanta twistless tape, other types have been added from time to time, including the Sun suit, and the self-help garments, which make it possible to train infants of two years of age and over to dress themselves. Practically all of the improvements in the dressing of infants for the last fifty years have been originated by Mr. Earnshaw. Mr. Alexander remained with the concern until his death, in November, 1928. The company has capital of $500,000, and employs 600 operatives. Ernest B. Dane is president, Albert J. Meserve, treasurer, and Albert M. Grant, secretary.

SOME LOCAL TEXTILE ENTERPRISES

The Eastern Yarn Company was incorporated in 1913, with capital of $50,000, for the manufacture of cotton thread and yarns. The plant

is equipped with 296 spindles, and with complete dyeing and bleaching departments. E. C. Jones is president and B. G. Rae, treasurer.

In 1916, the Futurity Thread Company was incorporated, and has capital of $40,000. The plant employs 100 operatives in the manufacture of cotton threads, the plant being equipped with 3,000 spindles. E. C. Jones is president and secretary, and B. G. Rae, treasurer of the concern.

The Security Mills were incorporated in 1919, and now have capital of $610,000. The company is engaged in the manufacture of astrachans, eiderdowns, fleece linings, woolen, worsted, and rayon and knitted fabrics of all kinds, and employs 170 operatives.

In 1928 a substantial addition to the plant was made, when a one-story and basement building, 80 by 125 feet, containing 10,000 square feet, was erected, affording room for the installation of forty additional knitting machines.

Leon Rubenstein is president, and Philip Rubenstein, is treasurer, and the corporation maintains a New York office at 31 West Twenty-seventh Street.

The Newton Wool Scouring Company was incorporated in 1921, to engage in wool scouring and sorting. E. P. O'Brien is president and treasurer, and George F. O'Brien is secretary of the corporation.

In 1921, the Bauer Knitting Mills, Inc., were incorporated and are engaged in producing woolen and cotton, silk and cotton, and rayon undergarments. George H. Bauer is the owner, president and treasurer of the corporation.

The Alden Knitting Mills, Inc., were incorporated in 1925, and produce silk, rayon, and worsted underwear and fabrics. G. R. Toney is president and treasurer.

The Silurian Mills, owned by W. S. Cordingly & Son, are engaged in the production of shoddy and extracts, and employ 100 operatives.

The Wellesley Woolen Company, owned by Edward F. Maguire, operating with an equipment of fifteen sets of cards, carries on custom stripping.

The Morschner Dye Works, Inc., of which R. Morschner is president, and F. C. Wittig, treasurer, dyes woolen and worsted yarns and raw stock, and hosiery, rayon, skeins, and piece goods.

THE NEW ENGLAND CONCRETE PIPE CORPORATION

In 1928, the New England Concrete Pipe Corporation purchased about 300,000 square feet of land in Newton Upper Falls, and erected a factory and office building, costing about $150,000. The plant was equipped with the latest machinery for the production of cement pipes by a process almost new in this section of the country. Gordon S. Rutherford, of Cleveland, Ohio, is president, John A. Burke, of Boston, and S. G. Rutherford, of Cleveland, vice presidents, H. C. Eames, of New York, treasurer, and C. W. Hood, of Boston, secretary. The corporation has capital of $200,000.

FROM AUTOMOBILES TO PHOTOGRAPHS OF DISTINCTION

Critics of Massachusetts delight in pointing out that in the early days of the automobile this state was prominent in the production of horseless carriages, and allowed production to become centered in the Middle West, but they never emphasize the factors which led to the migration of this industry and they cleverly conceal the fact that the Bay State plants of many of these pioneer concerns are now occupied by new enterprises,

many of which are employing more workers than the local auto concerns carried on their rolls in their palmiest days.

In the city of Newton is one of these significant illustrations, and it is all the more remarkable because the enterprise in question is one where the average student of industrial economics would scarcely expect to find evidence of a large force of skilled employees. And yet in a little over a quarter of a century there has come into being in Massachusetts a concern, now possessing an international reputation in the field of photographic portraiture, which has grown from one small studio on a side street in the city of Worcester to a successful corporation, whose operations cover all of the principal manufacturing and business centers of the eastern half of the United States, and which employs 500 men and women.

We are wont to think of the business of portrait photography in terms of a one-man studio, rather than as a combination of the manufacturer, with a made-to-order product, an art, a profession, and a retail business.

This Massachusetts enterprise really had its genesis as far back as the period of the Civil War, when David Bachrach, as an employee of William H. Weaver, then producing photographs for *Harper's Weekly*, was called upon to photograph Abraham Lincoln at the time he delivered his epic utterance "of the people, by the people, and for the people," at the dedication of the battlefield of Gettysburg, in 1863. Following the war, Mr. Bachrach set up a modest studio in Baltimore, where he evolved many of the processes by which the path of the modern photographer is made easy, and where his inventive powers were applied to the improvement of the art. It was here, too, that his two sons, Louis Fabian and Walter Keyser Bachrach, received their education in the Baltimore Polytechnic Institute, later becoming connected with the famous Falk, Core and Burr McIntosh studios, while the former seized the opportunity of studying at the Art Students' League.

But Bachrach, Inc., as it is known today began in 1904 when Louis Fabian Bachrach borrowed $1,000 from his father, purchased the Fitton studio, in Worcester, and seven years later formed Louis Fabian Bachrach, Inc., at the same time opening a Boston studio. Then followed the invasion of Providence, Hartford, Springfield, New Bedford, and New Haven, while his brother, Walter K., assumed charge of the Washington, D. C., studio, and Philadelphia and New York were added to the chain which was further extended to cities in the Middle West. The business had grown to such proportions by 1916 that a finishing department was established in Newton, where, two years later, the executive offices were removed. In 1925, a merger took place between Louis Fabian Bachrach, Inc., and The Bachrach, Inc., Maryland, in which latter concern were embraced at that time the New York, Philadelphia, Washington and Baltimore studios, then managed by Walter K. Bachrach, and the new corporation has since been known as Bachrach, Inc.

The same year, the necessity of taking care of the work of 36 studios prompted the purchase of the large plant formerly used by the Stanley Motor Vehicle Company located on the Charles River, in Newton, where has been established Bachrach Park, and here the executive offices and finishing studios are located. Since the beginning of the concern, Louis Fabian Bachrach has been intensely interested in human relations problems, and the corporation maintains an employees' council, operates a carefully planned promotion policy, provides non-contributory life insurance to its employees, operates what is known as the Bachrach pension fund, and carries on its activities under an industrial partnership plan

which permits those in executive positions to purchase the company's stock. The concern stands unique in the annals of the profession it represents, and is a conspicuous and notable example of the application of the principles of art and business to photography—undoubtedly the one outstanding unit of its kind in the world. Here again Massachusetts forges to the fore in a big and original way, and it is pertinent to add that all this development has come in the twentieth century. Louis Fabian Bachrach is president and Edward E. Hickey, treasurer of the corporation.

The Saxony Worsted Mills, in Nonantum, a village in Newton, was the first textile concern in the world to venture upon driving each mule by its own individual motor, closing a contract with the General Electric Company on December 5, 1906 for sixteen motors for this purpose. Six months later motors were installed on the balance of the mules in the plant. Up to that time only the group system of driving had been employed in the operation of mules because of the variable nature of the load and the special characteristics that would be required by the motors. But the problem was successfully solved by the installation of the motors and engineers promptly admitted that for smoothness of operation and ease of control the old mechanical system could not equal the new method.

For many years the plant was a part of the United States Worsted Corporation, and the equipment included 21,380 spindles. The unit includes sixteen buildings of various types, having a total area of 262,268 square feet, and a comparatively new boiler room is equipped with four large oil-burning boilers, capable of supplying the entire plant with high pressure steam and heat and of generating sufficient alternating current to operate the entire unit.

In 1929 the plant was acquired by the Old Colony Trust Company, of Boston, for $245,000.

THE RAYTHEON MANUFACTURING COMPANY

The Raytheon Manufacturing Company is the latest substantial addition to the industrial concerns of the city of Newton, and it is currently producing the "Eveready" Raytheon radio tube at its local plant at the rate of 25,000 daily, compared with 3,000 in June, 1929. By October of that year, due to increased manufacturing facilities, the total was stepped from 3,000 to 8,000, and by the close of 1929 a daily rate of from 25,000 to 30,000 tubes a day was maintained.

During that year plant facilities were rapidly and substantially expanded, new labor-saving machines installed and operations coordinated. Approximately 1,000 hands are employed and 10,000 square feet of manufacturing area are utilized. A new engineering department devoted solely to research and experimentation has been opened.

It is the intention of the officers of the company to expand production to upwards of 50,000 tubes daily, but not at a pace which will impair present operating efficiency.

The Raytheon Production Corporation, the operating company, has outstanding 100,000 shares and $1,000,000 bonds. The former is held entirely by Raytheon Manufacturing Company, together with $500,000 bonds. National Carbon Company, Inc., subsidiary of Union Carbide and Carbon Corporation, holds the remaining $500,000 bonds, representing funds expended in Raytheon's development program. In addition, the carbon company holds an option to purchase for cash on or before July 1, 1934, the 100,000 shares of Raytheon Production Corporation, for $19,500,000 and $2,500,000 per year addition to October 15, 1938. The figure

plus proceeds of payment to Raytheon Manufacturing Company of $500,000 upon surrender of its Raytheon Production Corporation bonds, is equivalent to $200 a share of Raytheon Production to 1934 and $25 per share a year additional to 1938.

Raytheon Manufacturing Company, the holding company, has outstanding, at the close of 1929, 110,250 shares, against 100,000 in May of that year. The increase is due to payment of stock dividends—5 per cent each of the preceding two quarters. It was stated in May, 1929, that dividends would be paid for the present in stock in order to conserve cash resources. It is not unlikely that the stock may be put on a cash-plus-stock-dividend basis sometime in 1930.

In 1928, the C. G. Howes Company, of Boston, erected in Newton, a dye house, cleansing plant and store, of brick and stucco construction, one story and basement, 54x38 feet in dimensions.

In 1921, the Boston Knitting Mills, Inc., were incorporated, with capital of $40,000, since increased to $50,000, and engaged in the manufacture of wash cloths, infants' and children's knitted underwear, and union suits, at Somerville. In April, 1927, the concern removed to a new plant, which it erected in Newton, and the two stories and basement were equipped with modern machinery, enabling it to double its former capacity.

S. L. Berger is president and treasurer, and 75 hands are employed.

The Belger Company, of which O. A. Belger is owner, manufactures textile machinery specialties.

The Brown-Gordon Company employs 50 operatives, in producing children's dresses, George Kaplan being president, Phoebe Gordon, clerk, and Ellis Gordon, treasurer.

The Central Railway Signal Company which has capital of $400,000 employs 150 hands in the manufacture of railway signals, including fuses and torpedoes, F. A. Buckley being vice president, Ralph L. Longden, general manager, and William S. Whitman, treasurer of the corporation.

C. F. Crehore & Son, a partnership made up of A. C. Dennison and Llewellyn A. Marr, manufactures Jacquard cards, at its Newton Lower Falls plant.

M. Frank Lucas operates a large plant, at West Newton, devoted to the production of builders finish, and employs upwards of 40 operatives.

At Newton Upper Falls are located the factories of the Masten & Wells Fireworks Manufacturing Company, one of New England's old-established institutions, and one of the pioneers in the production of fireworks. The company maintains its headquarters, at 22 Hawley Street, Boston. M. F. Davis is president, H. W. Davis, treasurer, and A. B. Hutchins, clerk.

Two concerns in Newton are engaged in the production of radio supplies and specialties—the Newton Pressed Steel & Manufacturing Company, which employs thirty-five operatives in manufacturing automobile and radio apparatus, and of which R. Sementilli is president, J. Antonellis, secretary, and A. Pescosolido, treasurer, and the Peerless Radio Corporation, at whose Newton Lower Falls plant 100 hands are employed in manufacturing radio supplies, W. J. Henry being president, and W. E. Watrous, treasurer of this concern, which has capital of $150,000.

The Nonantum Company, Inc., is engaged in the manufacture of cotton and silk fabrics.

The Strangman Manufacturing Company capitalized for $150,000,

employs forty operatives in the production of builders finish. Solon B. Small is president, and Walter F. Foss is treasurer.

The West Newton Curtain Company owned by Thomas McEnaney, employs fifty operatives in the manufacture of novelty curtains.

The New England Laundries, Inc., of Winchester, operates a branch plant in Newton.

Newton has sixty-eight manufacturing establishments, an increase of fourteen since 1921. They have capital of $13,215,765, and in 1927 produced commodities valued at $14,898,858, employed 2,348 workers, to whom were paid $3,851,000, in wages, and used stock and materials valued at $7,078,408. The rank of the local industries shows knit goods to be the principal products, with textile machinery second, curtains third, and worsted goods, fourth.

CHAPTER XXXVII

MALDEN

ANOTHER NOTABLE EXAMPLE OF THE CHANGING INDUSTRIAL ERA

The City of Malden offers small consolation to the busybodies who find solace in emphasizing failure and who invariably attribute any success that is achieved to the goddess of luck. Fifty years ago their songs of pessimism would have produced sweet harmony to their ears had they taken Malden as an example of a place where industrial activity was but nominal, for, in 1875, only 1,062 persons were employed in such manufacturing establishments as the municipality then possessed, and the goods produced there were valued at only $2,664,484.

A historian of the time, after alluding to rubber goods, sand and emery papers and shoe lasts, as constituting all of the local manufactures of that period, and mentioning by name only the Boston Rubber Shoe Company, said: "Products of the town are not of unusual importance."

One wonders what he would record today if he canvassed the city and learned there were 114 manufacturing plants, whose products in 1927 were valued at $28,592,713; that they employed 4,687 wage earners (or more than four times the total in 1875), to whom were paid in wages, $5,226,377, and that they fabricated into finished products stock and materials costing $12,539,836. These 114 industrial plants represented a capital investment of $24,837,643, an increase over the figure of 1922, of $8,719,465, or an average increase during the five year period of $1,743,893 per annum.

Nineteen new industries came into being in Malden in 1926 and since 1920, when there were eighty-three, the total increase has been thirty-one in a seven year period, or an average of four per annum. In 1925 there were 4,192 employees in the industrial establishments of the city, and the 1927 figure shows a gain of 495 over the former year.

That Malden manufacturers are conducting their operations more efficiently than they were a few years ago is shown by the fact that in 1919, when the total value of the local products was but $22,077,624, there were 4,723 wage earners employed in the plants, while in 1927, with almost 100 less employees, the value of the products manufactured was $7,500,000 greater than that of 1919.

The rank of the principal products manufactured in the city during 1927 was as follows: (1) Rubber boots and shoes; (2) Paints and varnishes; (3) Knit goods; (4) Flour and grain mill products; (5) Soap; (6) Druggists' preparations; (7) Electrical apparatus.

THE GEORGE P. COX LAST COMPANY

Undoubtedly one of the earliest factories established in Malden was that of the George P. Cox Last Company, which traces its industrial beginning to the year when this country, for the second time, submitted its grievances with England to the arbitrament of the sword.

The company was established in 1812 by Samuel Cox, at a time when

the making of lasts was done by hand. At that period he made lasts for leather goods and later started the manufacture of lasts for rubber footwear. Until comparatively recent years the plant of the Cox Company was the only one in the world devoted exclusively to the production of wooden lasts for rubber goods.

About 1850 the firm of Samuel Cox & Sons succeeded Samuel Cox, and in 1859 George P. Cox assumed sole ownership, which he retained until his death, in 1896. Associated with him in the enterprise was his brother, David P. Cox, who had been connected with the undertaking from his fourteenth year, and who had been the manager for thirty years, at the time of his retirement, in 1890.

In 1904, the corporation built a new factory, and kiln buildings for drying the maple blocks, also dry sheds and block sheds, all of this equipment being for the handling of maple blocks from the time they are received from the forests until they are dried and turned into lasts.

From 1812 to 1900—a period of 88 years—one or more members of the Cox family were identified with that concern, which began making lasts almost a century and a quarter ago. Since the first year of this century others have carried on the traditions of the company, and in 1928 it was acquired by Harold C. Buckminster, of Malden, who for some years had been its treasurer, and for thirty years previous a stockholder and director. It is still operated under its old corporate name, has capital of $80,000, and employs fifty operatives, some of whom have been on the payroll for upwards of forty years.

Harold C. Buckminster is president, H. B. Baker, who has been interested in the corporation for many years, is treasurer, and William H. Johnson is general manager. The latter official was formerly in charge of styles and patterns of the U. S. Rubber Company, having been connected with that corporation and the Boston Rubber Shoe Company, one of its subsidiaries, for more than forty years.

THE BOSTON RUBBER SHOE COMPANY AND ITS PREDECESSORS

Malden was among the municipalities where the earlier attempts to carry on the manufacture of India rubber were made, and in all probability this industry has been locally represented by large or small units since the late eighteen-thirties.

In 1850 the Edgeworth Rubber Company was organized and a factory was erected, in Malden, where it was hoped to successfully compete against the four large concerns then operating under licenses granted by Charles Goodyear to manufacture vulcanized rubber boots and shoes, but the venture proved unsuccessful and the assets were sold in 1853 to the Malden Manufacturing Company which had been formed with a capital of $175,000, and whose sponsors included Gardiner G. Hubbard, later destined to be a prominent figure in the commercial development of the Bell Telephone; William Judson, the legal adviser of Charles Goodyear; T. C. Wales, the pioneer in the sale of native rubber shoes, and, at a later period, the patentee of the Arctic overshoe; John Bertram, of Salem, one of that city's great ship merchants and one of the largest and earliest importers of India rubber; Joshua Sylvester, whose mercantile connections in England promised a lucrative development of the foreign field, and Nathaniel Hayward, who shares in history equal honors with Goodyear for discoveries and processes which made crude rubber of commercial and economic value.

The first meeting of the stockholders of the Malden Manufacturing

Company was held on Wednesday, May 11, 1853, at the office of Gardiner G. Hubbard, 5 Congress Street, Boston, with L. Candee, Nathaniel Hayward, William Judson, G. N. Davis, J. C. Dunn, D. D. Broadhead, Samuel F. Upton, and Mr. Hubbard in attendance. Messrs. Hubbard, Candee, Broadhead, Hayward and Dunn were chosen directors, the latter being elected treasurer, and G. N. Davis, clerk, and at a subsequent meeting of the directors, held the same day, Mr. Hubbard was chosen president, and Mr. Upton, superintendent of the plant. A committee was appointed, with full powers, to negotiate with the Goodyear interests for a license to manufacture rubber products, and on June 7, the agreement entered into was accepted. On that date, Thomas C. Wales was elected a director in place of Mr. Broadhead.

On June 16, 1853, the directors voted to purchase the land, buildings and machinery of the Edgeworth Company, and on August 5, George M. Davis was named as selling agent.

On September 8, 1853, Mr. Dunn resigned as treasurer and Elisha S. Converse was chosen in his stead, thereafter holding that position continually until his election to the presidency of the company, in 1894.

On January 11, 1854, Mr. Dunn retired as a director and Mr. Converse was elected, serving continuously as a member of the board until his decease, in 1904.

In February, 1855, the stockholders reduced the capital stock to $100,000, at which figure it remained until May 17, 1855, when it was increased to $194,000. In 1857 it was increased to $500,000, and in 1882 to $1,000,000; in 1892 to $3,000,000, and in 1894 to $5,000,000.

In May, 1855, the output of the company amounted to 400 pairs per day and that year the name was changed from the Malden Manufacturing Company to the Boston Rubber Shoe Company, which it bears today as one of the units of the United States Rubber Company.

In May, 1861, the stockholders combined the offices of treasurer and superintendent, Elisha S. Converse being unanimously elected to fill both offices, which he held for about three years. On the same date, J. W. Converse was elected a director, and on March 31, 1868, he was elected president, both of which offices he held continuously until his decease in August, 1894.

In March, 1868, the increased business appeared to warrant a corresponding enlargement of the plant and the treasurer was authorized to proceed with the erection of a brick building, a step that involved moving the original wooden plant and replacing it by a commodious structure more suited to the requirements of that period. The original wooden building, however, continued in service up to the time of the disastrous fire at the plant in November, 1875.

In a little more than fifteen years after the formation of the company production had increased from 260 pairs a day to 15,000 pairs per day, while the sales had jumped in the same period from $270,000 annually to $1,600,000 a year.

In May, 1871, the directors voted to remove the office of the company to the factory and instructed the treasurer to assume the superintendency of the plant, an arrangement which continued until the latter part of that year, when the duties of the latter official were assumed by E. F. Bickford, who thereafter served in that capacity and as manufacturing agent until April, 1907.

On November 29, 1875, the factory was entirely destroyed by fire, the only portion remaining available for further use being that portion de-

voted to the heater plant and the machine shop. Immediate steps were taken to replace the burned structure by one that should be even better than that destroyed, and the rebuilding was undertaken with such vigor that by May 29 of the following year, just six months from the date of the fire, a large portion of the machinery was running in the new building and by July the company's goods were being delivered at the Boston storehouse.

In 1882 land was purchased in the adjoining city of Melrose and a modern building was erected to meet the increasing demands for the company's goods. In 1884 land was sold to the Boston & Maine Railroad, opposite the factory buildings, in order that it might erect and maintain a passenger station for the convenience of the employees and the public. The increase of facilities at Melrose enabled the company to produce 40,000 pairs a day by September, 1889.

During the next ten years the business attained a high degree of efficiency, both in quantity and quality of production. The "Storm Slipper," so called, from small beginnings rose to a demand from the trade far in excess of the company's ability to meet it for a time. The introduction of the "Standloop" boot, for men, boys and youths, met with popular approval and unquestionably added to the sale of the company's boot product for a long period of years.

Superintendent Bickford patented a small steel shank and applied it to the manufacture of "Self Acting" overshoes. So popular was this device with the trade that for a time it increased the manufacture of self-acting shoes from 2 to 12 per cent of the total product of the factory, and the device was used by other rubber companies upon a royalty basis.

In May, 1887, C. C. Converse, who had been a member of the directorate for six years, was elected assistant treasurer, which office he held until 1893, when he was elected vice president, at which time Lester Leland was chosen assistant treasurer, the latter holding that office until he was elected treasurer, in 1895.

On October 24, 1894, E. S. Converse was elected president, and on June 14, 1895, H. E. Converse, who had been a director for six years, was elected general manager.

In December, 1895, the company purchased the last factory of Howard & Frohock, thus adding to its facilities, not only the ability to furnish lasts for its own use, but also enabling it to meet the requirements of other companies for such goods. In December, 1909, the machinery and business of the Vaughan Box Factory was similarly added to the equipment of the company, since which time it has not only furnished cases and cartons for its own use, but has been able to fill large orders for other companies in its immediate territory.

On August 1, 1898, by virtue of a favorable arrangement with the officers of the United States Rubber Company, it was decided to accept their proposition and thereafter to operate as one of the associated units of the latter organization.

On the death of E. S. Converse in 1904, his son, Col. H. E. Converse, was elected president.

In May, 1903, H. P. Ballard was chosen assistant treasurer, and in June, 1906, he was elected clerk.

The factory managers since the formation of the company have been Messrs. Samuel F. Upton, D. E. Haywood, Elisha S. Converse, John Robson, Sr., John B. Sweet, E. F. Bickford, John W. Robson, Frank L. Locke, W. E. Piper, G. L. Lawrence, J. D. Wilmot, L. H. Goodhue and C. R. Haynes.

The officers of the company, on May 1, 1929, were president, Francis B. Davis, Jr.; vice president and treasurer, Harry P. Ballard; assistant treasurer and clerk, Walter E. Woodward; assistant treasurer, Wilson H. Blackwell; comptroller, M. George Burnett, and the board of directors consisted of Francis B. Davis, Jr., Harry P. Ballard, William O. Cutter, Edward J. Coughlin, and Eric C. Burkman.

The people of Massachusetts are often told that the state is not one where business can be carried on successfully, but this Malden unit, coupled with the Revere Rubber Company, employing 1,000 hands, at Chelsea; two plants at Millville—the Woonsocket Rubber Company, employing 2,000 and the Lawrence Felting Company, a subsidiary of the Revere Rubber Company, another unit, the American Rubber Company at Cambridge, which carries 1,000 or more on its payroll, and a smaller plant,—the Stoughton Rubber Company, of Stoughton,—all representing a Massachusetts investment of more than $12,000,000 made by the United States Rubber Company, render it difficult to believe that so large a manufacturing corporation would continue to carry on operations in the Bay State if its big investment here was not justified.

CONVERSE RUBBER COMPANY

The Converse Rubber Company of Malden, Massachusetts, was founded in 1908, under the name of the Converse Rubber Shoe Company. In 1929 the business was reorganized under it present name with Mr. M. B. Kaufman as president, Mr. M. L. Paterson as vice president, A. H. Wechsler as secretary and F. R. Allen as treasurer. Mr. Kaufman also controls the Hodgman Rubber Company of Framingham, Massachusetts, with which was recently merged the Archer-Strauss Rubber Company. Mr. Kaufman is a man in his early thirties, and has ably demonstrated his ability to put industrial plants on a paying basis. To many it will be significant that a majority of the executives in both firms which he controls are men in their late twenties and early thirties.

The Converse Rubber Company factory at Malden is a most modern plant, with a floor space of nearly five acres, employing approximately 2,000 men and women and has a daily capacity of 20,000 pairs of rubber footwear of all kinds and descriptions.

The Converse Big "C" Line Rubber Footwear, Converse "Chix" novelty shoes for women, and Converse "Skoots" canvas shoes for every sport are distributed all over the United States, as well as in many countries abroad. Branches are maintained in New York City, Chicago and Minneapolis, and plans are now on foot to open further branch warehouses at strategic points. Western distribution is secured through a factory distributor in Salt Lake City, who also has branches at Denver, Colorado, and Portland, Oregon. Another distributor serves the Southern trade from Richmond, Virginia.

In September, 1929, the Converse Rubber Company purchased the Sporting Goods and Clothing Departments of the Hodgman Rubber Company, thereby giving Converse one of the most complete lines of sporting specialties manufactured in this country.

The Converse reputation for manufacturing quality rubber footwear has always been sound. Improvements both in manufacturing processes and distribution facilities have been many during the past years and there is every reason to believe that the present organization will continue to build an increasingly sound and profitable business under the new management.

Alexander Cochrane, came to the United States from Scotland, in

1849, and entered the firm of C. P. Talbot & Co., at Billerica, where he planned and built the chemical works of that concern. Ten years later he removed to Malden, and erected, in Everett, the plant of the Cochrane Print Works Company today capitalized for $200,000 and employing 250 hands in the bleaching, dyeing and printing of cotton.

J. Eugene Cochrane is president, Pauline Cochrane, secretary, and John C. Cochrane, treasurer, of the corporation.

In 1877, what is known today as the John H. Parker Company was established by the late John H. Parker, and for almost half a century the concern has been under the management of members of that family. It is engaged in the manufacture of felt, rubber, and leather footwear, employs 50 or more operatives, and is capitalized for $45,000.

Charles L. Parker is president and treasurer, A. M. Goss, clerk, and these two officials, with C. K. Parker, constitute the board of directors.

THE POTTER DRUG & CHEMICAL COMPANY

In 1928 was observed the fiftieth anniversary of the advent into American household of the internationally known Cuticura preparations, which had their origin as the result of the cure of a stubborn case of skin trouble brought to the attention of one of the members of the drug firm of Weeks & Potter, located in Boston, following which it was decided to manufacture the ointment for general distribution, the first sale being made over the counter on February 28, 1878. The unique designation followed the idea of George Robert White, then a young salesman in the employ of the concern, who had a decided natural bent for advertising.

The sale during the first year of its production was 30,000 boxes, while in 1927 3,000,000 boxes were marketed. To the end that the most advantageous benefit from the use of the ointment might be attained, Mr. White decided to evolve a soap embodying some of the emollient properties of the ointment, and in April, 1878, the first cakes of Cuticura soap for medicinal and toilet purposes were placed on the market, proving as great a success as the ointment, 173,000 cakes being sold the first year. In 1927 the sales reached 15,000,000 cakes.

Locally advertised in the Boston daily papers at the start, the national field was invaded in 1880, and international advertising began six years later, with the result that sales spread to every quarter of the globe, the campaign now including the newspapers of the United States, Canada, Great Britain, Ireland, South Africa, Egypt, India, China, Australia, and the Straits Settlements. Increasing demand for the products soon necessitated establishing branch laboratories in England, in 1916, in Australia in 1919, and in Canada, in 1921, in addition to the main laboratories, in Malden.

On January 1, 1883, the Potter Drug and Chemical Company succeeded the partnership of Weeks & Potter, and six years later the concern was incorporated, with Warren B. Potter as its first president. In 1892, a new and greatly enlarged laboratory and manufacturing plant was erected in Malden, for the production of soap, and the Cuticura shaving stick and talcum powder, were added to the line. By 1919 the manufacturing space at the Malden plant was more than doubled, and the entire business, including offices, was removed from Boston to that location.

During the World War the company manufactured 1,500,000 cakes of Cuticura soap of special size for the American army, and received as a tribute for its patriotism a citation from the United States Government for it coöperation.

On the death of Mr. Potter, December 2, 1889, George Robert White, who had entered the employ of Weeks & Potter, in 1864, at the age of seventeen years, became president, and under his administration the concern with which his name was linked developed into one of the great institutions of Massachusetts. His gift of $1,000,000 for the new building of the Massachusetts College of Pharmacy, and his numerous and large donations to the Boston Museum of Fine Arts, as well as many private philanthropies, were capped by the bequest made in his will at the time of his death on January 27, 1922, of $11,000,000 to the City of Boston, for works of public utility and beauty, and stamped him as not only one who gave the best that was in him to the public service, and as a benefactor to his fellow men, but as a citizen who, in character, set an example in accomplishments as an industrialist worthy of emulation by others, but also who attained a preeminent position among his associates by mastering the details of all his undertakings, and as a man whose industry and perseverance laid the foundation of a career whose influence was far-reaching.

The son of a union veteran of the Civil War, tradition had taught him that the warrant for authority, decision and leadership was native ability, training and experience, and not the product of wealth or inheritance. Early in life he set his standards high and he lived and died a true type of the highest form of American citizen.

He was succeeded as president of the corporation by Charles Lyman Hamilton, who entered the employ of the concern in 1883, as a bookkeeper, when there was but two other office employees. Samuel M. Best is vice president and W. D. Gooch, secretary and treasurer.

Included in the company's 150 employees are those who have served it continuously between 40 and 49 years, one who has been on the rolls for fifty years, sixteen who have worked for it between thirty and thirty-nine years, thirty-one who have been employed between twenty and twenty-nine years, twenty-seven who have been associated with it between ten and nineteen years, and forty-five who have served it between five and nine years—a most remarkable record. The corporation has capital of $200,000. Charles L. Hamilton is president, Samuel M. Best, vice president, and W. D. Gooch, treasurer and secretary.

SOME CONCERNS OF MORE RECENT TIMES

In 1893, Charles Henry Niedner established the linen fire hose manufacturing business now carried on by his sons, William H. and Charles L., under the corporate name of Charles Niedner's Sons Company, Inc. The concern is capitalized for $105,000 and employs ninety-five operatives in the manufacture of linen fire hose.

About 1910 William E. Arnold began the manufacture of heel and sole moulds for rubber production, and started with less than ten employees.

On January 1, 1921, the William E. Arnold Company was incorporated, with $60,000 capital, and in the intervening years the company has marketed its goods to the leading rubber and shoe manufacturers, not only in New England, but in the West and in Canada. Thirty employees are now on the payroll. William E. Arnold is president, Arthur Farineau, treasurer, and J. A. Eddy, secretary of the corporation.

In 1917, the Multiple Winding Company was incorporated, with capital of $75,000, and manufactures multiple and electrical yarns, J. B. Jamieson being president and treasurer, of the corporation. The Domestic Mills are a subsidiary of the Multiple Winding Company.

THE ADVENT OF KNITTING CONCERNS

Malden is the home of a number of knitting industries that have come into corporate being within the past ten or fifteen years, and which employ in the aggregate several hundred hands.

In 1907, the Malden Knitting Mills were established, and became incorporated the following year. Today, this concern has capital of $500,000. Men's, women's and children's sweaters and bathing suits constitute the company's products, and 600 hands are constantly employed at the plant, which has been greatly enlarged within recent years. Henry Feuerstein is president, and Samuel C. Feuerstein, treasurer.

The factory is equipped with ten sets of cards, 3,600 woolen and 2,100 worsted spindles, ten winders, 150 knitting machines, thirty-six rib machines, ten loop machines, 200 sewing machines, two pickers, two garnets, three boilers, and complete dyeing, bleaching and dry finishing departments.

In 1919 the Bryant Knitting Mills were incorporated, with capital of $150,000, and employ 125 operatives, in the production of men's, women's, and children's sweaters, H. Katzen being president, and B. E. Green, treasurer. In 1929 this corporation erected an addition to its plant, which gave it 20,000 more square feet of manufacturing space.

In 1919, the Revere Knitting Mills, Inc., were incorporated, with $200,000 capital, and are engaged in manufacturing men's, women's and children's woolen and worsted sweaters. Two hundred hands are employed, and David Hillson is president, and B. E. Green, treasurer, of the corporation. In the fall of 1929 the company erected an addition to its plant at a cost of $30,000.

The Mystic Knitting Company was incorporated in 1925, and has capital of $25,000. This concern manufactures sweaters and is owned by William Horstmeyer.

The Williams Knitting Company, owned by W. H. Williams, produces athletic shirts and trunks, bathing suits, and men's flat underwear.

THE MALDEN MACHINE TOOL COMPANY

In 1920, Fred H. and Albert O. Sander formed the Malden Machine Tool Company and in the intervening years the plant has been constantly enlarged. Intending to carry on only general repair work, the company soon found itself called upon for dies and jigs, and next for complete rubber shoe moulds for moulding an entire shoe, which have found a good market, and within recent years conveyor, heel assembling and heel cutting machines, novelty stampings, requiring dies, drill jigs and tools for a popular bath room product, and dies and stampings for advertising novelties, have been manufactured.

Since the company does nothing but order work the wide variety of its products simply goes to show how manifold are the ramifications of a machine unit. Whether it is a simple nail, a piece of furniture, a cooking utensil, a toothpick or a match, a needle or a piece of thread, shoes, stockings, or a piece of fabric—all are machine-made. In short, the whole world today is machine-made, and the contribution of a single trade—that of machinists—is all embracing.

The experience of the Messrs. Sander proves beyond peradventure that Massachusetts still possesses as good, if not better machinists, as are found in any other part of the country, while it demonstrates that to this craft a large share of our industrial prowess is to be credited.

SOME OF THE OTHER ENTERPRISES IN MALDEN

The Arms Manufacturing Company, of Deerfield, maintains a branch plant, in Malden.

The Bascom-Beshong Company, whose Boston office is at 12 West Street, manufactures silk underwear, at its Malden plant, where twenty-five operatives are employed. A. J. Beshong is president, F. E. Thayer, treasurer, and W. H. Carpenter, vice president and secretary, of the corporation.

The Blakeslee Company, Inc., of which Anna L. Blakeslee, is president and George E. Blakeslee, secretary and treasurer, manufactures infants' and women's wear, employing sixty hands, and having capital of $45,000.

The Blue Diamond Materials Company maintains a branch plant, in Malden, the main office and headquarters being in West Roxbury.

The Boston Steel & Manufacturing Company employs forty operatives in fabricating light structural steel and steel plate products, R. E. Hanson being president, Clarence Cochrane, vice president, and A. G. Hanson, treasurer.

The Gregory & Read Company operates a wood heel factory, in Malden, as an auxiliary unit to the production of women's McKay shoes, by this old-established concern.

The International Development Company is engaged in the manufacture of skates, and employs fifty operatives. John W. Collinson is president, Almer Coe, vice president, Stanley E. Collinson, treasurer, and E. H. Johnson, secretary.

The Samuel E. Jordan Brush Company, capitalized for $50,000, is engaged in the production of brushes, George W. Soule being president and treasurer of the corporation.

The Malden Electric Company, one of the Tenney public utilities, and having capital of $2,643,300, employs 300 operatives, while the Malden & Melrose Gas Light Company, another of the Tenney interests, and having capital of $4,249,775, employs 450 in the manufacture of gas.

Mersky Brothers Shoe Company, with capital of $60,000, is engaged in the production of shoes, and employs 150 workers. Louis Mersky is president, Joseph Mersky, secretary, and Samuel Mersky, treasurer.

The Richards Company, Inc., engaged in the production of pig and mixed metals employs fifty operatives in its Malden factory. George H. Clough is president, Wm. G. Roberts, and J. D. Nichols, vice presidents, H. O. Williams, secretary, and W. S. Young, treasurer.

The H. E. Rust Company, owned by Howard E. Rust, employs fifty operatives in the manufacture of children's clothing.

The Valpey Press, owned by Fred L. Valpey, produces folding paper boxes, and employs fifty operatives.

Wadsworth-Howland & Co., Inc., of Boston, operates a large factory in Malden, maintaining branches in Lowell, Lynn, Worcester, and Springfield, and employing altogether 350 operatives.

Malden offers excellent opportunities to those who are looking for desirable industrial locations. Favorable transportation facilities exist, taxes are reasonable, and the supply of labor is plentiful, intelligent and skilled. No doubt the next five or ten years will show just as great strides as have been observed during the last ten years and more and more Malden will take on the character of an industrial, rather than that of a purely mercantile and residential community.

CHAPTER XXXVIII

EVERETT

THE IRON CITY OF NEW ENGLAND

For a hundred years following 1795 the manufacture of brick stood first among Everett's industries, and the industrial development of the city was not notable until the advent of the present century, although the municipality was the seat of many enterprises of more than ordinary size prior to 1900.

The critic of Massachusetts who finds pleasure in dilating upon our alleged industrial decline gains little solace in analysing the facts applying to this city on the Mystic River.

In 1885 Everett boasted of forty-four manufacturing establishments. In 1927 there were 121 concerns engaged in industrial production in the city.

In 1885, the total invested capital of the forty-four local manufacturing concerns then existent was $1,129,698, of which only $167,470 was in plants and machinery. In 1927, the total invested capital of the 121 plants was in excess of $62,500,000.

In 1885, there were 717 employees in the forty-four plants, or an average of sixteen persons in each establishment, and to them were paid in wages, $304,270, or an average wage of $424.36.

In 1927, there were 6,105 wage earners employed in the 121 manufacturing establishments, or an average of fifty employees per plant to whom were paid in wages that year $9,006,451, or an average of $1,475.25 each.

In 1885, the manufacture of brick and of building materials represented two-thirds of the total income of the entire forty-four plants of that era, while oils, paints and chemicals constituted most of the remaining third.

Contrast these figures with those of 1927 when fifty-four out of the 121 industries of the city, including the leading units such as petroleum refining; the manufacture of gas; coke; pig iron from the ore; ethyl alcohol; chemicals; and paving and roofing materials, manufactured products valued at $55,695,924, or almost 80% of the total value of all local commodities, which was $70,206,911.

The phenomenal growth of Everett as an industrial center is plainly emphasized when one studies the figures of the seven year period between 1921 and 1927. In the former year there were 114 local plants, with capital of $50,221,163, using stock and materials valued at $22,491,144, paying wages amounting to $5,844,165 to 4,455 employees, and manufacturing products valued at $46,082,534.

In 1927, the 121 establishments then doing business in the city had capital of $62,500,000, used stock and materials amounting to $41,033,193, paid wages amounting to $9,006,431, to 6,105 wage earners, and manufacturing products valued at $70,206,911.

The increase in value of products from 1926 to 1927 was $15,243,060.

THE J. W. MOORE MACHINE COMPANY

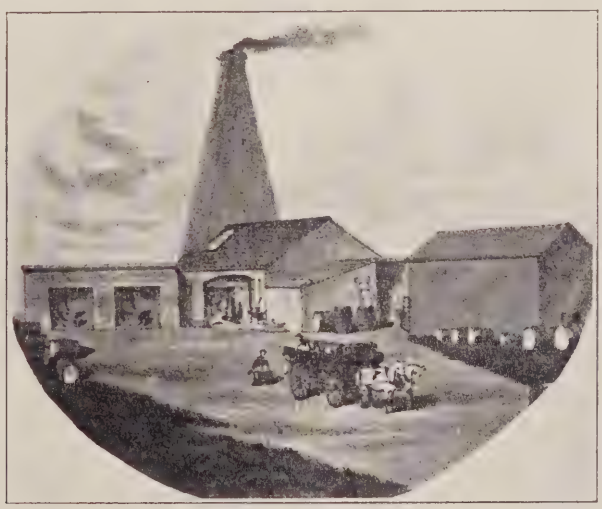
In 1836, the Moore & Wyman Elevator & Machine Works were established to carry on a general machine business and to manufacture elevators. The concern continued under its original name for seventy-two years, but in 1908 J. W. and C. D. Moore severed their connection with the enterprise, organized The J. W. Moore Machine Company, and carried on a similar business.

C. D. Moore died in 1909, and J. W. Moore continued the concern in leased quarters, at 592 East First Street, South Boston, but in 1918 the present plant, in Everett, was purchased, where the company employs about seventy-five operatives.

R. H. Moore is president, W. Fielding clerk, and Plummer C. Spring is treasurer of the corporation.

THE CARPENTER-MORTON COMPANY

In 1840, Eleazer F. Pratt began the business now internationally known as the Carpenter-Morton Company, when he started a small paint shop at 5 Broad Street, Boston. In the early days of the business the Hub was the principal port for ocean-going vessels, and as there was much marine painting to be executed, the Pratt shop prospered.



VARNISH PLANT OF CARPENTER-MORTON COMPANY, BOSTON, 1855

In 1841, the store was moved to 107-109 State Street, which location was maintained for thirty years thereafter. In 1843, George B. Rogers joined as a partner, and the firm became Pratt & Rogers, and three years later George W. Banker entered the concern as its third partner, and the name was changed to Pratt, Rogers & Co. In 1849, Messrs. Pratt and Rogers withdrew, and Mattias Crocker and George O. Carpenter joined Banker in forming the firm of Banker, Crocker & Co., and upon the withdrawal of Crocker, in 1854, the firm name was changed to Banker & Carpenter.

In 1860, John D. Morton entered the employ of the company as a bookkeeper, and became a partner three years later, and at about the same period Edward T. Woodward and Isaiah Woodbury, were admitted to

partnership, and the firm became Carpenter, Woodward & Morton. In 1868 Messrs. Banker & Woodbury withdrew, the remaining partners continuing business for twenty-five years thereafter as Carpenter, Woodward & Morton. In 1885, Frederick H. Newton joined the firm, and in 1888 Edwin A. Rogers became a member. On January 1, 1892, the business was incorporated as the Carpenter-Morton Company.

A disastrous fire in 1861, totally destroyed the State Street factory and offices, and after occupying temporary quarters, the concern moved to the new building subsequently occupied by the Western Union Telegraph Company, and in 1871 transferred to 73-79 Clinton Street; later to 99 Milk Street, and in 1877, to 151 Milk Street. In 1898, the executive offices and store were located in the Sudbury Building, 77-79 Sudbury Street, occupying the entire first floor and basement, with the factory on Atlantic Avenue.

In 1885 the house began the manufacture of varnish stains, a novel product at that time, designed for staining and varnishing at one operation, furniture, woodwork or floors. These were marketed first under the name, Campbell's Varnish Stains, but in 1919 were renamed Carmote Varnish Stains as "Carmote" was adopted for the trademark of the entire line of varnishes, enamels, stains and finishes.

About 1892 the company found that manufacturers of straw hats were buying a quick drying colored varnish for finishing ladies' straw hats. The thought occurred to the executives of the company that the product would also be found useful by millinery stores, and it was marketed in bottles and sold under the name "Colorite Straw Hat Finish." The company soon discovered that the outlet for this product was the retail drug store, and today it is sold in more than ninety-eight per cent of the drug stores in the United States and in thousands of others throughout the world.

In 1909 the company purchased land in Everett and built a modern plant, and while changes in manufacturing methods in the paint and varnish industry have been many in recent years, the enterprise has always kept abreast of these by making improvements which would enable it to produce by the latest and most approved methods.

In 1923 the company built a stackless varnish plant,—the first of its kind in New England and one of the first three in the country. Greater uniformity in output is possible through the cooking of the varnish gums by this method.

The Carpenter-Morton Company is a New England institution, financed by New England capital and entirely independent of other organizations. Its business has been built up by manufacturing paints and varnishes of highest quality and by rendering prompt and efficient service to its clientele. Its president, and general manager, George C. Morton, has been connected with the corporation since 1886.

A. I. McLauthlin is vice president, William E. Gilmour, treasurer, and M. L. Foss, secretary. The concern has capital of $1,000,000 and gives employment to 160 operatives.

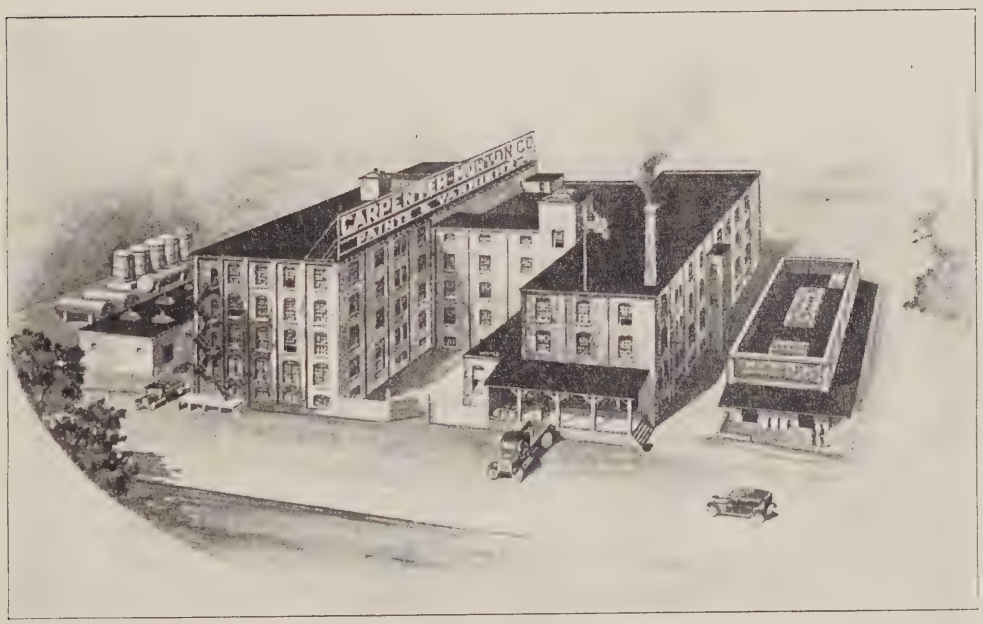
THE MERRIMAC CHEMICAL COMPANY

The concentration of textiles, both in the cotton and woolen fields of production, early paved the way for the development of chemical industries.

The first extensive need of chemicals in America was brought about because with the advent of dyers and bleachers from England they could



PAINT AND GRINDING WORKS OF CARPENTER-MORTON COMPANY, BOSTON, 1855



FACTORY AND VARNISH WORKS OF THE CARPENTER-MORTON COMPANY, EVERETT, 1928

not ply their skill unless they were provided with Glauber's salt, blue vitriol, sulphuric acid, and a few other primary chemicals, which at the outset were of necessity imported from the mother country. Logwood and indigo were the most important dyeing materials, and these, too, came from overseas. While oil of vitriol was manufactured in Philadelphia, as early as 1793, it was produced in such limited quantity that the date of its introduction is of more importance historically than industrially. In 1810 eight thousand pounds of copperas were produced in Vermont, while three years later alum was made in Pennsylvania to a small extent.

But it was not until after the close of the War of 1812 that the manufacture of chemicals began to attain prominence in the United States, and even then the growth of the industry was slow and halting, as it required large capital in its development, and money at that period was scarce. The machinery was expensive, and the trade required a peculiar type of building. Again, chemists and skilled workmen were scarce, and this combination of factors deterred rapid development during the early part of the nineteenth century. It was just prior to 1840, that the Merrimack Manufacturing Company and the Lowell Bleachery, located in the then recently created City of Lowell, erected their own acid chambers under the supervision of an Alsatian engineer.

In 1849 Alexander Cochrane came to the United States, from Scotland, where he had been engaged in chemical activities, and entering the firm of C. P. Talbot & Co., in North Billerica, planned and built the chemical works of that concern.

Four years later, Robert B. Eaton, of Woburn, founded the Woburn Chemical Works, and located his small plant at the North Wilmington station of the Boston & Maine Railroad. The methods of manufacture were necessarily primitive, as contrasted with those of today, but Mr. Eaton became a disciple of New England quality, and because of the invariable excellence of his products, he early gained a reputation for reliability, which resulted in his business being developed to an extent that required plant enlargements, and finding it impossible to attend to both the manufacturing and marketing departments, he decided to incorporate the concern under the laws of Massachusetts, and on November 27, 1863, the Merrimac Chemical Company was born.

In 1858 Alexander Cochrane removed from Billerica to Malden, and established in Everett, the Cochrane Chemical Company, which became the property of his sons, Alexander and Hugh Cochrane, seven years later.

In 1868, the New England Chemical Company was established in Everett, and four years later the business of the concern was purchased by the Cochrane Chemical Company which specialized in the manufacture of the Leavine chemicals. The Cochrane unit expanded the plant materially, and became the pioneer in chemical production in Everett, which industry today is one of the leading trades in the city.

By 1872, the Merrimac Chemical Company was doing a prosperous business at its plant in Woburn, in the production of oil of vitriol, muriatic, sulphuric, and nitric acids, soda ash, tin crystals, Glauber's salt, and salt cake, and, in 1886, the manufacture of alum was commenced. The following year nitrate of iron and bisulphate of soda were first produced. followed by silicate of soda, in 1890, and by Merrimac carbonizer, the next year. In 1896, hydrate of alumina was introduced in this country by the concern, made under the Bayer process patents, the American rights to which were controlled by the Merrimac Chemical Company.

In 1899 the plant of William H. Swift & Co., of Boston was acquired,

and during the next fifteen years the Merrimac concern became the leading manufacturers of arsenical compounds for insect control in the United States.

In 1917 the Cochrane Chemical Company, then enjoying a nation-wide reputation in the chemical field, was purchased, and by the acquisition of the plant and good will of this concern the Merrimac Chemical Company instantly became the leader in the New England chemical field.

Almost with the opening of hostilities abroad in the late war, the Merrimac concern began its great contribution to the chemical industry, and the upheaval in Europe was responsible in large measure for the advances that have been made by American chemists within the past fifteen years.

In 1915, the plant of the New England Manufacturing Company was erected in Woburn, and was operated by the Merrimac Chemical Company in coöperation with the New England Gas & Coke Company. Contracts were entered into with the French Government for T N T, Phenol, and Picric Acids, and were continued throughout the duration of the struggle, all sulphonating and nitrating acids being supplied by the Merrimac Company.

It was during the early days of the war, when the situation appeared black in the United States, due to the cessation of the steady flow of dyestuffs from Germany, that the Merrimac Chemical Company averted what threatened to be a dyestuff famine, by promptly inaugurating intensive research on H - Acid, one of the most important and most difficult dyestuff intermediates to manufacture, and in 1917 it placed on the market, in quantities sufficient to cope with the demands, the first H - Acid ever made in the United States.

What is more, the product surpassed in efficiency and quality that produced under the highest pre-war standards. The Merrimac concern has extended the manufacture of intermediates to include Chromotrope and L - Acids.

Pursuing its expansion policy the next important step was the purchase, in 1924, of the Anderson Chemical Company, of New Jersey, which had a long and well-established reputation in the manufacture of solvents and nitro cotton solutions. A new building was erected, at the Everett plant, where the production of the Anderson chemicals has since been carried on.

Opening up an entirely new field of Merrimac production, the Anderson division has become an important branch of the business, due to the immense extension of the field for lacquers and solvents.

In 1926 the Merrimac Company leased the clay mines, at Bennington, Vermont, owned by the Vermont Kaolia Corporation, installed new apparatus there, and, with the coöperation of the research and engineering departments, produced fire and sagger clay in quantity, beginning in 1927, and adding filler, china, rubber, and enameling clays, and Kaolin, in 1928.

The Woburn plant comprises forty-four buildings, and consists of 150 acres of land, while the Everett plant includes upwards of one hundred acres, extending for more than a half mile along the waterfront. Connecting with both the Boston & Albany and Boston & Maine roads, and possessing the finest terminal facilities which have been developed by dredging and by the installation of modern equipment for discharging bulk cargo, the Merrimac Chemical Company enjoys exceptional facilities for the economical and expeditious receipt and distribution of water borne freight.

To facilitate prompt deliveries to a wider field of customers, the Merrimac Chemical Manufacturing Company was formed, in 1927, and this subsidiary of the parent company operates the steel motor vessel, *Merrimac*, 150 feet in length, 25 feet in beam, and drawing 13½ feet when fully loaded. Equipped with a 400-horse-power Diesel engine, which gives it a speed of ten knots, the *Merrimac* has a deadweight capacity of 450 tons and can carry about 300 tons of miscellaneous chemicals. It is primarily engaged in transporting the products of the Merrimac Company between various Atlantic coast ports.

The officers of the corporation early appreciated that its increasing usefulness to industry and commerce demanded the scientific resources of a research laboratory, equipped with a competent staff, and that it could not afford from any standpoint in this era of industrial evolution and advancement to rest its high reputation upon the genius of the pioneers.

A competent research department was established at the Woburn plant, which has since become the directing force in improving the quality of products, in increasing the efficiency of processes, and in blazing the path of progress to the end that the Merrimac Company may continue its leadership in the chemical industry. Long since it established a policy which permits of no variation by which all Merrimac products must pass the most rigid chemical tests of uniformity and purity before leaving the plants, and its control laboratories are manned with equipment and personnel which effectively protect its customers and which maintain the high standards long since established for its commodities.

Attached to the sales department is a chemical engineer, whose services are at the disposal of the purchasers to assist in designing equipment for the proper handling of Merrimac products, and to advise as to the most economical and efficient methods for their use.

The executive, purchasing, order, traffic, accounting, and sales departments occupy two floors of the building located at 148 State Street, Boston.

To attempt to chronicle in detail the contribution that has been made to that all-important servant of industry—Chemistry—by the Merrimac Chemical Company, since its inception is an impossible task, but when one reviews the incalculable benefits it has conferred upon the textile, paper, rubber, metal, and other manufactures in and out of New England this corporation deserves a prominent niche in the industrial hall of fame.

Its products form the foundation of every science, art and manufacturing process. They have served the farmer, who must know about the chemical action of fertilizers; they have attended the practice of the physician who relies implicitly upon the chemical action of drugs and medicines; they have aided the artist in the production of his pigments, whether they were transferred to canvas, parchment, or the printed or lithographed page; they have collaborated with the manufacturer in carrying out the processes of chemical alteration in rubber, cement, leather, steel, pulp, rags, soap, or of a thousand and one raw materials. Perhaps no Massachusetts concern has done more to instill into the minds of the progressive manufacturer that he cannot continue to expect more capital to flow into his corporation unless he abandons the old hit-or-miss, or unscientific rule-of-thumb methods, and substitutes therefor the two important services that the Merrimac Chemical Company offers him—control and research.

There are prudent investors today who will not risk their money in any industry that neglects chemical research, and as Francis J. Curtis, in charge of the Technical Service, of the Sales Department of the Merrimac Company, truly says: "The industry that cannot afford chemical control and research will not long be able to afford a president or a shipping clerk."

The company employs in its Everett and Woburn plants, and its Boston office, upwards of 1,500 persons, and has capital of $3,527,000. In 1929 the concern began operations in a new $100,000 contact plant, at the Everett Works, through which it has been found possible to lower the cost of sulphuric acid production and to increase the tonnage.

Charles Belknap is president, William McNear Rand, vice president and treasurer, Frank G. Stantial, vice president, William I. Warren, assistant treasurer, Frederick S. Hatch, assistant to the president, William M. Rand, sales manager, Walter R. Andrews, assistant sales manager, Francis J. Curtis, in charge of technical service, Lester A. Pratt, Ph.D., manager of the Anderson Chemical division, Everett E. Brainard, director of purchases, A. Keith Eaton, assistant purchasing agent, Arthur C. Wyer, traffic manager, Osborne Bezanson, production manager, Arthur L. Gardner, works manager, at Everett, Daniel S. Dinsmoor, superintendent of the plant, Thomas J. Shannon, superintendent of the Woburn plant, Josiah B. Rutter, chief engineer, William S. Wilson, director of research, Alfred H. Bump, assistant director of research, and Salmon W. Wilder, Chairman of the board of directors. The general managers of the corporation are The Russell Company of 50 State Street, Boston.

In October, 1929, the stockholders of the company voted to sell the business and assets of the corporation to the Monsanto Chemical Works, of Missouri, the latter corporation exchanging for the Merimac Chemical Company's 70,560 shares, a total of 84,672 shares of Monsanto, or the equivalent of 1 1/5 shares of the latter concern for each share of Merrimac. The offices of the Merrimac unit announced that the merger should afford the stockholders the benefit of greater stability through increased diversification of products and markets; greater market ability of their investment and greater expectation of appreciation in market value of their investment by reason of more rapidly expanding sales and profits.

It was announced that the Massachusetts plants of the Merrimac Chemical Company would continue as heretofore to be managed and operated by the same officers as heretofore, these officials of Monsanto being added to the local directorate.

In 1869, the Union Stone Company began the manufacture of abrasives.

THE WATERS GOVERNOR COMPANY

In 1871, The Waters Governor Company was formed to manufacture steam-engine governors invented and patented by Charles Waters, and while many changes in personnel have occurred in the concern in the intervening sixty years, the company carries on operations today, William R. Dewey being president and treasurer, and Howland Twombley, clerk of the corporation, which employs forty operatives.

H. K. PORTER, INC.

From the inception of the "age of metal," crude forms of tongs or pincers were used for holding, bending or cutting soft or pliable material. As the use of metal and processes of tempering and treating were

developed, these primitive tools were improved and made more efficient, but up to as recently as 1855 bolt clippers were merely extra large nippers, crude and with limited capacity.

H. K. Porter, a pioneer American manufacturer of bolt clippers, and recognized as the originator of the modern type of this important tool, invented, in 1880, the adjusting section which made this device a practical commodity. Every workable clipper made since that year has attempted in some manner to imitate the features embodied in the Porter invention.

The first adjustment was by shims, which afforded a graduated adjustment dependent upon the thickness of each shim inserted but later this method was improved by Mr. Porter by substituting set screws in lieu of the shims, thus providing a micrometer adjustment capable of meeting all requirements from a thousandth of an inch upward.

Originally designed for blacksmiths and carriage builders, Mr. Porter has lived to see the product of his brain become an integral part of the mechanical age in which he has been an important participant. In the automobile, radio, mechanical and electrical fields, the special tool he originally designed for a specific task has become as common an item of factory and shop equipment as the wrench or the screw driver.

That a man should devote more than two score years to the perfecting and production of a single type of tool is unique in the manufacturing annals of Massachusetts.

Practical experience, combined with specially developed, modern machinery, exhaustive laboratory tests and scientific management have enabled him to establish the firm of H. K. Porter, Inc., at Everett, where half a hundred skilled mechanics are continually employed in the manufacture of a line of bolt, wire, and storage battery clippers unrivalled in the United States.

H. W. Porter is president, James Geddes, vice president and treasurer, and James G. Geddes, clerk of the corporation.

STONE & FORSYTH COMPANY

In 1881, Edward H. Stone and James B. Forsyth formed the partnership of Stone & Forsyth, and in 1914, the Stone & Forsyth Company was incorporated. On the death of Mr. Forsyth, in 1914, Mr. Stone succeeded him as president, but later resigned, and Otto R. Karnheim was elected to that position, Robert M. Stone being chosen vice president, and Edward H. Stone, treasurer. The manufacture of paper, twine, cordage and paper specialties were first carried on at Stoneham, but, in 1913, the company, now capitalized for $400,000, built a modern plant in Everett, which, in 1928, was greatly enlarged and where 200 operatives are employed. The office and headquarters are located at 67 Kingston Street, Boston and warehouses are maintained in Boston and Charlestown, from which a large distribution of twine, rope and wrapping paper is made.

Otto R. Karnheim is president, Robert M. Stone, vice president, Ferdinand J. L. Hoss, secretary, and Edward H. Stone, treasurer.

THE NEW ENGLAND STRUCTURAL COMPANY

In 1892 the Norton Iron Company was established to manufacture the Norton door check,—the first practical device of the kind that had been invented. Soon the business was extended to include the manufacture of light iron used in building construction, including stairs, grilles, fire escapes, elevator fronts, and the like.

The development of structural steel for building purposes opened up

a wide field, and in 1898 the concern became the New England Structural Company and its product since that time has been exclusively structural steel work for bridges and buildings.

From a small beginning the plant has grown until today it is the largest fabricator of structural steel in New England, occupies nearly eight acres of space, and employs 300 workers, the concern having capital of $500,000. Eighty per cent of the company's contracts are executed in Metropolitan Boston, its name being identified with practically all the major building operations that have taken place there in the past two decades. The president of the corporation, Walter B. Douglass, M. I. T. 1891, entered the employ of the old Norton Iron Company soon after his graduation, and the treasurer, Charles N. Fitts, M. I. T. 1891, became connected with the original concern in 1895. Having had complete charge of the company's affairs since 1904, there are few of the present-day fabricators of steel who have seen the industry develop from practically nothing to one of the outstanding industries in the country as have these two products of a Massachusetts technical school.

THE MOORE SHANK COMPANY

In 1898, Alfred M. and Chester M. Moore, father and son, started the manufacture of shoe shanks in a small factory in Everett, under the name of Moore & Co., producing fibre shanks only. About a year later a small plant was built in Malden, and soon after this the concern engaged in the manufacture of steel shanks by a new process developed by the founders, which produced an article of high quality. The business steadily expanded until, in 1907, the assembling department was moved to Boston, and in 1911 a modern brick factory was built by the concern in Everett, with ample space which permitted the concentration of all departments under one roof. In 1913, an addition was built nearly doubling the plant capacity. In 1923, Alfred M. Moore, then eighty years old, retired and disposed of his holdings to his son, who incorporated the business under the name of The Moore Shank Company. Sixty hands are constantly employed at the plant. Chester M. Moore is president and treasurer, and Alfred G. Moore, secretary.

In 1928 the company added the manufacture of metal corner beads at a branch factory, located at 25 Spencer Street, Stoneham, where twelve men are employed.

THE NEW ENGLAND FUEL & TRANSPORTATION COMPANY

The first "big business" ever done in Massachusetts was that of building primitive homes for the Pilgrim Fathers at Plymouth, and the next thing was to heat these homes so that the Pilgrim Mothers would not freeze to death during the bleak and terrible winters. Thousands of men, young and old, of later generations, have known the backaches of pushing a bucksaw and splitting a wood-pile to keep the home fires burning in the dwelling houses of Massachusetts. With our phenomenal growth from a mere handful of Pilgrims in 1620 to more than 4,000,000, Massachusetts citizens today has come an entire change in the method of living and nothing is now more important in creating a residence than to install new methods of heating it. Big business and modern conditions are observed hand in hand at the Everett plant of the New England Fuel & Transportation Company, which was established in 1898 by the old New England Gas & Coke Company and which was acquired by the Massachusetts Gas Companies, in 1902.

In 1917 the New England Fuel & Transportation Company was organized under a deed of trust, to take over the by-product plant of the Gas & Coke Company. Upwards of 700,000 tons of by-product coke are produced annually at the Everett works, the great bulk of which is speedily delivered by a huge fleet of trucks of almost interminable numbers to more than one hundred thousand homes within motoring distance of the place of production. Since its inception a little more than thirty years ago, the plant has been steadily enlarged until today it includes 355 ovens and takes rank as the third largest concern of its kind in the country. In 1928 an important expansion took place when 55 modern coke ovens were added, enabling the production to be increased by 1,000 tons a day, making the total daily capacity 2,700 tons. The company receives its supply of coal from West Virginia, the commodity being brought into Everett in its own fleet of steamers. In 1928 a new and completely equipped research laboratory was installed at the local plant, which is manned by a competent staff of chemists.

Through its selling agents—the New England Coal & Coke Company —it supplies foundry coke to a majority of the leading New England foundries.

Coal tar, sulphate of ammonia, and other by-products are manufactured at the plant and the concern is capitalized for $28,200,000. William E. McKay is president, T. W. Kennedy, R. M. Folsom and G. A. G. Wood, vice presidents, C. A. Alden, treasurer, and A. S. Bull, assistant secretary.

The associate corporation—the New England Coal & Coke Company has capital of $1,500,000, and the officers of the latter corporation are: Edward Page, president, G. A. G. Wood, C. P. Chase, and J. J. McSweeney, vice presidents, C. A. Alden, treasurer and A. S. Bull, clerk.

Here are two enterprises, one formed only about thirty years ago, and the other less than a decade and a half ago, with aggregate capital approaching $30,000,000 whose activities emphasize the fact that Massachusetts has progressed in the coke field as rapidly as any other section of the United States.

THE BOSTON VARNISH COMPANY

One of the best known industrial plants in Everett, whose products enjoy nation-wide popularity and are becoming more extensively distributed in foreign countries, is that of the Boston Varnish Company, situated where Second and Boston streets join in the East Everett section.

While a mere infant in years as concerns in the paint and varnish industry go, the company through aggressive management has reached a point where its products, particularly the KYANIZE finishes, are known and used in almost every city, village and hamlet in the United States.

In 1900, less than a generation ago, in the shadow of Bunker Hill, within gunshot of the Old South Meeting-House and close enough to benefit from the influence of Faneuil Hall, "The Cradle of Liberty," two men—James B. Lord and Harry A. Hall—established the Boston Varnish Company.

From its infancy the concern has been guided and governed by one ideal, one purpose and one ambition, mutually shared by its two founders, and that is to make only the highest grade varnishes and enamels that human ingenuity can assemble and to brand them with the name "KYANIZE."

The original plant is still in use and is situated on the small triangular

strip of land between Second Street and the Boston & Maine tracks. From time to time extensive additions and alterations, due to an ever expanding business, have stretched the company's buildings over a large area in that locality.

Founded under such auspices and governed solely by the influence of two such men, the success of KYANIZE varnishes and enamels and of the company itself were almost assured from the start. That the foundation was sound and the purposes of the founders justified is evidenced by the steady growth of the concern and the ever-increasing popularity of its products.

Today the Everett plant, one of the largest varnish factories in the United States, still under the guiding influence of its historical landmarks, and still governed by the two men to whose vision its sturdy growth is a tribute, continues to produce all that is best in varnishes and enamels, measuring its output in terms of quality only.

James B. Lord is president, Harry B. Winne, vice president, and Harry A. Hall, treasurer, of the corporation, which has capital of $1,250,000 and which employs 175 operatives.

THE EAGLE SHOE MANUFACTURING COMPANY

In 1902, Frank T. Johanson organized the Eagle Shoe Manufacturing Company and began operations in Lynn, at the same time carrying on a branch factory in Boston. In 1913 a new plant was built in Everett, where all production was consolidated under one roof, and where about 3,000 pairs of shoes are turned out daily. The concern has capital of $250,000. August Beckman is president and treasurer, John J. Barry, secretary, and Roy T. Johanson, assistant treasurer, and 200 operatives are employed.

THE EVERETT WORKS OF THE GENERAL ELECTRIC COMPANY

The Jupiter Steel Casting Company commenced operations in Everett, about 1890, first producing steel castings by the crucible process in a small wooden building, and with a very few employees. It was apparent to the officers that there was a growing demand for steel castings of a larger size than could be manufactured by the crucible process, and a few years later the U. S. Steel Casting Company was organized and an open hearth foundry was built. The property being located on the waterfront, with ample marsh area for disposal of foundry refuse, proved ideal for such a plant. Prior to this venture Massachusetts manufacturers were obliged to procure their steel castings from Pennsylvania.

For a number of years the foundry operated successfully and did a flourishing business. Then came a decline, and the plant was closed down and remained idle for some time. About 1905, a new company was organized under the name of the Massachusetts Steel Casting Company and Tropenas converters, for the production of small and medium sized steel castings, were installed, which later gave way to open hearth furnaces.

In 1903, the General Electric Company became interested in the business and for three years procured a large tonnage from the company, purchasing the property in 1906, and modernizing the buildings. A few years ago an iron foundry department was established for the production of machine moulded castings of light weight.

The present capacity of the unit is 10,000 tons of finished open hearth castings per year, and 5,000 tons of light grey iron castings.

Labor conditions at the plant have been of the best, with full coöper-

ation between the men and management. The unit has operated for the past ten or fifteen years under a plan where representatives elected by the employees meet regularly with selected men of the management group to discuss and settle all problems. During this entire period no problem has arisen that has not been satisfactorily disposed of by the plan of representation.

Six hundred employees are carried on the payroll and 278,468 square feet of manufacturing space are utilized.

In 1927, the Everett Works were awarded a bronze tablet by President Gerard Swope, of the General Electric Company, in recognition of its having passed one year without a lost-time accident.

The record was unique in that the work of handling molten metals in the making of castings is particularly hazardous. The chipping department, at the Everett plant, had not had a lost-time accident since July 25, 1925, while the service and maintenance group had not experienced one since March 15, 1926.

Here again one finds evidence of a plant that was idle at the beginning of the century, being taken over by another concern and of ultimately growing into one of the city's large and stable industries.

SOME RECENTLY INCORPORATED ENTERPRISES

The Harrison Shoe Company was founded in 1906 by James E. Clark, of Boston, and began business in Lynn, removing to a new factory it erected in Everett, in 1912. The concern is capitalized for $240,000, and employs 250 operatives in the manufacture of men's and boys' shoes.

August Beckman is president and treasurer, Roy T. Johanson, vice president, and John J. Barry, secretary.

THE SHAWMUT IRON & WIRE WORKS, INC.

In 1907 the Shawmut Iron & Wire Works, Inc., was established and began operations on Beverly Street, Boston, moving later to a larger building in Charlestown. In 1914 when increasing demands necessitated larger facilities, a modern brick plant was erected, at Tileston and Norman streets, Everett, where the manufacture of ornamental iron and wire work has since been carried on. The products include bar iron fencing, wire partitions, wire guards for all purposes and light metal work, including steel shelving, these materials being supplied and installed in large quantities in industrial plants in and around Boston and throughout New England.

During the war period the factory was entirely devoted to the manufacture of armor piercing bullets for the U. S. Government, and the company was very successful in the production of this material. After the war most of the special machines were disposed of and the plant resumed the manufacture of its regular line of commodities.

The corporation employs between twenty-five and thirty-five men. John C. O'Connell is president and Peter C. O'Connell is secretary.

The Ideal Can Company was incorporated in 1911, and the concern carried on operations in Boston until 1915, when it removed to Everett. The company manufactures sheet metal barrels, pails, tanks, small stampings, and sheet metal specialties, F. S. Blanchard being in charge of the company's business.

In 1912, the Boston Fibre Company was established, with capital of $150,000, and is engaged in the manufacture of cotton and jute felts, and

cotton waste. The concern also operates a plant in Athol. Philip Dooskin is president, and Max Levensohn, treasurer.

In 1915 the plant of A. G. Bradish & Son, Inc., an old established concern which was not incorporated until 1919, was removed from Boston to Everett, where the production of fasteners for butter and lard tubs has since been carried on.

THE BEACON OIL COMPANY

The success of the Beacon Oil Company is a refutation of the theory that the geographical location of New England, requiring the long distance transportation of raw material, is a serious handicap to any business locating within its borders. The Beacon Oil Company in the short space of ten years, has grown to be one of the most important refining, marketing and distributing organizations in New England and New York.

It was incorporated under the laws of Massachusetts, in 1919, to conduct a general petroleum producing, refining and marketing business. The project was conceived in the mind of Clifford M. Leonard, president of the Leonard Construction Company of New York and Chicago, who had gained a large experience in the production and refining of oils in the West and who believed that a refinery, located in the midst of the large distributing area of New England and New York State, would be profitable.

In his search of the New England coast for a site, he came to the conclusion that the best location for a refinery was at Everett, just across the Mystic River from Boston, adjacent to the plant of the New England Fuel and Transportation Company and the New England Gas & Coke Company's works. The latter unit was then owned by the Massachusetts Gas Companies—a holding organization for public utilities, coal, steamship, iron and other enterprises—and the contact with the owners of this business resulted in the Massachusetts Gas Companies joining in the enterprise and that connection continued until a few years ago. The construction of the Everett refinery was started late in 1919, and in July, of the following year, eleven months after breaking ground, the first cargo of crude oil passed through the refinery. The oil tanker which brought the crude product to the plant was bunkered with fuel oil for its return trip produced from its own cargo, within a few hours from the time the vessel finished discharging.

The Everett property consists of more than 100 acres of land, having direct rail connections with the Boston & Maine, and the Boston & Albany railroads, and a switching connection with the New York, New Haven and Hartford Railroad. The deep water frontage on the Mystic and Island End rivers, permits the simultaneous docking of two large tank steamers and several oil barges.

At the outset the plant consisted of two pipe stills and fifteen shell stills, with a total capacity of approximately 600,000 gallons of crude oil daily. With the increasing demand for better quality gasoline, the first cracking units installed in New England were constructed in 1922, and employed the "Tank and Tube" process. Since that year the refinery equipment has been continually extended and modernized, and has conformed to the latest developments of modern oil refining practice. Today, the plant consists of fourteen cracking units, seven re-run stills, and four asphalt stills, with a total capacity of over 1,500,000 gallons of crude oil per day. The refinery also has one of the most complete and modern

gas collecting systems of any refinery and has grown to be the largest in New England and New York.

There is also in operation at Everett, the most modern type of continuous treating plant, together with a complete lubricating unit for compounding and blending lubricating oils. The underground concrete storage for crude and fuel oil has a total capacity of about 46,000,000 gallons, while steel storage for other products total 17,000,000 additional gallons.

The company operates a fleet of tank steamers in which crude oil is transported from the producing areas to the Everett refinery, and a fleet of coastwise steamers and barges for transporting finished products along the seaboard.

When it began business, the company operated primarily as a refining organization, but, early realizing the necessity of company-controlled outlets as a nucleus around which to build dealer business, a subsidiary company, known as the "Colonial Filling Stations" was formed, and began the acquisition of sites and the construction of filling stations. The latter were of a distinctive architectural type and of an unusual green color. Special care was taken in the training of employees to the end that courteous attention should be given to every need of the motorist, and this high standard of service soon became characteristic of the Beacon-Colonial stations.

The distributing facilities were rapidly expanded until today throughout New England and New York State the company has about 400 service stations, which it owns or leases, and seventy-seven bulk distributing stations, including sixteen water terminals along the New England Coast, in New York City, Albany and the Erie Canal, thus covering the territory from New York City to Northern Maine and as far west as Buffalo. In addition, the company has several thousand dealers and about 100 authorized distributors.

The rapid growth of the enterprise, as shown by the sales of gasoline, which have multiplied four times within the last four years, is due principally to the fact that the Beacon Oil Company has always insisted upon the highest quality products and an exceptional standard of service at its stations.

In 1925 it became a pioneer in evolving a superior quality of gasoline product, which it marketed as "New Colonial Gasoline." The company's engineers found that it was the presence of so-called "borderland" or the kerosene mixture in ordinary gasoline which was the cause of the knocking, fouling, carbon, crank case dilution and loss of power then being experienced by motorists. Following intensive research and a tremendous investment in new refining equipment and the addition of new processes, the Beacon Oil Company was able to eliminate the last vestige of this "borderland" mixture from its then new product. This extra refining cost more money than was required to produce ordinary gasoline, but on account of the tremendous increase in business it brought to the stations, the company was able to sell it at the same price as the former type, and the sales, without enlargement of facilities, were nearly doubled.

With the announcement, in 1927, of Ethyl anti-knock fluid, the Beacon Oil Company was the first in New England to provide an Ethyl gasoline which combined all the features of the New Colonial Gasoline with the anti-knock properties of Ethyl.

In the meantime Beacon Motor Oil had been introduced and became

popular due to its notable freedom from carbon forming content, its exceptional ability to stand up and hold its body under the intense heat and the extra pressure of the high compression motors, and its quality of flowing freely at zero temperatures.

In 1927, in response to the demand of motorists for a pure Pennsylvania oil, the company introduced its new Beacon-Penn Motor Oil, a lubricant of the highest quality and guaranteed to be 100 per cent pure Pennsylvania oil.

Its industrial oil department is fast assuming an important position in the trade and it is also a large purveyor of fuel oils, gas oils, road oils, and asphalt to various industries.

Another progressive step taken by the Beacon concern was the introduction of gasoline especially refined for winter use. Long research convinced the company's engineers that difficult starting and the sluggish pick-up which featured winter motoring were largely due to the fact that motorists were being provided with practically the same gasoline during the winter season as in the summer months. Obviously, because of the wide difference between the temperatures at these two seasons of the year, it was impossible to expect gas to perform as well in mid-winter as in summer.

The result of the research provided Colonial Wintergas, a gasoline so refined as to give its best performance at temperatures ranging from freezing to zero or below. Special emphasis was placed on the ease of starting and the quick pick-up without resorting to a long and tedious warming up process, but power and mileage were not sacrificed in achieving these ends.

During July of the summer of 1929 in line with the company policy of making Colonial Filling Stations real service stations as well, announcement was made of another addition to the Colonial conveniences, Atlas Tires—a high grade tire, sold with an unconditional guarantee and at a popular price—distributed exclusively by the Beacon Oil Company.

The Beacon Oil Company, while one of the smaller units in the industry, has been large enough to operate efficiently. It has been especially fortunate in starting operations at a period later than most of the larger oil companies and thus has not been obliged to inherit obsolete or inefficient equipment.

The company is a joint owner, with the Sun Oil Company, of the Beacon Sun Oil Company, which controls large potential oil producing acreage in the Maracaibo Lake district in Venezuela.

The corporation has 1,500,000 shares of common stock, and employs 2,100 operatives. Richard H. Kahle is president, E. N. Wrightington, vice president and treasurer, L. J. Walsh, vice president and secretary, George E. Hite, Jr., vice president, and H. W. Boutilier, secretary and clerk of the corporation.

In January, 1929, arrangements were completed whereby the Standard Oil Company of New Jersey, acquired a substantial stock interest in the Beacon Oil Company by the purchase of 350,000 shares of its authorized but then unissued common stock.

This purchase, however, did not involve a change of name, or personnel of the officers of the Beacon organization, but it did involve plans for expansion in the territory served by the Everett corporation, and brought the Standard Oil Company of New Jersey into a section of the country in which it had not previously been represented.

WHITE & HODGES

In 1920, the firm of White & Hodges succeeded Frank W. Kimball & Company of Boston, a partnership which was formed in August, 1914, by the late Frank W. Kimball, of Lynn, and Alpheus E. White, of Chicago, who in 1917 removed to Boston. The concern had its Boston office at 120 Pearl Street, and its factory at Everett. Early in 1920, Mr. Kimball died, and the new firm of White & Hodges, made up of Mr. White, and Theodore W. Hodges, of Lynn, who had been with the unit as salesman, was formed. In March, 1922, the concern removed its Boston office to Everett.

In April, 1926, it suffered a heavy loss through fire, but upon rebuilding, enlarged the factory to three times the size of the former building.

The products are principally compounded oils and greases for the tanning and textile trades, and the concern does a considerable export business.

A PITTSBURGH-ON-THE-MYSTIC

The revival of an industry which was dormant in Massachusetts for more than a century would appear to constitute evidence that a little courage, some degree of vision, and at least a smattering of the pioneer spirit that animated the early industrial overlords, are still left in this Commonwealth today.

On a peninsula, which up to a few years ago was regarded as a marsh, was constructed in 1925 and 1926, on the Everett waterfront, and adjoining the shores of the Mystic River, the first units of the Mystic Iron Works, with its $5,000,000 blast furnace turning out every working day 500 tons of pig iron, which is about 20 per cent of the quantity of this type of raw material used daily by the industries of the six New England states. The furnace is the largest in the east, and unsurpassed by any similar development east of Pittsburg.

The thud of pigs of iron automatically dropping into freight cars at Everett, signalized the rebirth of the blast furnace industry in Massachusetts.

This modern plant—the last word in blast furnace construction—was two years in the making.

No plant in the world is more strategically located, and in the opinion of experts who have studied the situation, its erection is believed to be but the first step in the making of a modern steel plant that ultimately will rival the most efficient possessed by the Pittsburg, Youngstown, Gary, or Birmingham districts.

It is in its alliance with the great coke plant, established in 1898, with its 355 ovens, in serried ranks meeting the demands of the blast furnace, that its great potentialities lie.

Included in the groups going to make up the holding organization—The Massachusetts Gas Companies—are the Mystic Iron Works, the Boston Consoldiated Gas Company, the New England Fuel & Transportation Company, the New England Coal & Coke Company, the Mystic Steamship Company, Castner, Currant & Bullitt, Inc., large international coal distributors and mine owners, and the C. C. B. Smokeless Coal Company.

With such major industries brought into one gigantic corporation, it is easy to see the challenge that is thrown down to Pittsburg and the western and southern pig iron producers, for at this Mystic plant coal from company-owned mines, brought to company-owned docks, located at

tidewater, in company-owned ships, and converted into coke in a company owning the coking plant, supplies the blast furnace with its fuel. Other company-owned vessels bring the limestone, used in the pig iron process, from seaboard quarries at Rockland, Maine, and discharge it almost on the hearth of the blast furnace. Finally, and perhaps the most important factor, is that today iron ore is being brought by ships to Everett from Africa, Sweden, Newfoundland, and Spain, for less than half what it costs, ton for ton, to haul iron by rail from Pittsburg to New York City.

To finance the works, the parent organization pledged its credit on a $5,000,000 note issue, thus testifying to the abiding faith of its management and its bankers, not only in the industrial survival, but of the manufacturing expansion of Massachusetts. As the plant stands today, it has storage facilities for 125,000 tons of ore, besides the necessary limestone. The coke supply presents no problem, as it is manufactured but a few yards away by one of the units included in the ownership.

The ore bridge at the Mystic plant has a clear span of 250 feet, with a length over all of 450 feet, and is equipped with an eight-ton bucket, which takes the ore and limestone away from the dock and transfers them to the stock piles in convenient proximity to the furnace.

Close to the bridge is the blast furnace itself, into the top of whose stack there is charged at regular intervals a 27,000-pound mixture of ore, coke and limestone.

Provision has been made by the promoters for the addition of other units, but as the plant stands today, it has thirty-four miles of railroad in operation within the production area of the Massachusetts Gas Company's group, a fleet of eight locomotives, existing facilities for the unloading of 1,500 tons of coal per hour; overhead coal pockets of 20,000-ton capacity; a magnificent powerhouse; and electric railway that carries the 85-ton ladle of molten iron to the casting house, and an endless chain of molds, cooled by a water spray, which takes on the liquid mass at one end and dumps solid pigs of iron directly into freight cars at the other end, 150 feet away. These little pigs then go to market by being whirled to the rail junction of the New York Central and Boston & Maine irons, less than half a mile distant.

As a substantial contributor to the industrial renaissance of Massachusetts, this plant, embodying all the latest blast furnace principles, and practices, has solved for all time the needs of the industrial plants of Massachusetts and New England, whose operations have heretofore depended solely upon supplies of pig iron shipped to this and other North Atlantic ports from the great iron producing centers of the United States.

On September 27, 1926, President Calvin Coolidge lighted the blast furnace by means of a direct wire from the White House, and by that act an industry that had been a lost art in Massachusetts for a century and a half was revived. While John Winthrop's primitive blast furnace, set up in Lynn in 1643, had a capacity of eight tons a week, the Mystic furnace is capable of turning out 3,000 tons of pig iron every six working days.

But the latest development on the Mystic River is not surrounded by the privileges which accrued to the entrepreneurs of 1643 who were granted, by the General Court, the exclusive privilege of making iron for twenty-one years—were exempted from all public charges and taxation upon their capital and excused, with their workmen, from military training. William E. McKay is chairman of the board; Thomas W. Kennedy, president and general manager; Edward Page, vice president; C. A. Alden,

treasurer, and Auber S. Bull, clerk of the corporation. The corporation has capital of $5,500,000 and employs 150 men.

OTHER RECENT INDUSTRIAL DEVELOPMENTS

The Warren Pipe & Foundry Company, of Phillipsburg, N. J., announced in 1928 its decision to erect a cast iron pipe manufacturing plant, in Everett, due to the fact that its New England business forms a large proportion of its sales.

In 1929, the Edison Electric Illuminating Company of Boston petitioned the State Department of Public Utilities for the removal of certain zoning restrictions in Everett applying to the height of buildings, and which it desired to have removed in order that it might erect in the city a new generating station fully as large, if not larger, than the company's immense plant at Weymouth.

The Edison Company acquired about thirty-nine acres of land and water frontage along the Mystic River flats, bordered by the holdings of the New England Fuel & Transportation Company and Alford and Dexter streets.

Of this total, thirty-two acres are in Everett, and the remaining seven constitute a strip seventy feet deep on the Alford Street side, located in Boston. The company officials in studying the future requirements for the use of electric service within the next two or three years in the Northern district served by it that it would necessitate a large expenditure of money to provide transmission line underground from its L Street station, in South Boston, or overhead and underground lines from the Edgar Station, in Weyworth.

The company's executives therefore decided that a generative unit located on the waterfront of Mystic River, in Everett, would not only relieve the other stations of this demand, but that it will more evenly balance the system so far as servicing the public is concerned. A careful study is being made and when the plans are announced they will call for the most modern equipment in the Mystic Station—the name officially proposed by President Edgar for the new unit, and it will be one of the most up-to-date generating plants in the country.

The site is being cleared; necessary filling accomplished in order to bring the entire area of thirty-nine acres to the desired grade, the river is being dredged to make possible water transportation of coal to the new plant and an adequate supply of cool water for condensing purposes. It is expected that the first units of the Mystic Station will be in operation not later than the fall of 1934.

THE CITY'S OTHER INDUSTRIES

The main plant of the Boston Consolidated Gas Company, which corporation is capitalized for $26,259,600, and employs upwards of 1,800 men and women, is located in Everett. The history of this concern is carried in the chapter devoted to the industries of Boston.

In Everett, is situated one of the large units of the American Glue Company, which operates branches in Peabody, Rockport, Stoneham, Walpole, and Cambridge, employs 2,500 hands, is capitalized for $5,750,600, and is engaged in the manufacture of glue, gelatine, isinglass and cloth abrasives.

The New England business of the Barrett Company is centered in Everett, 300 hands being employed at its factory there in manufacturing coal tar products, and roofing and building materials.

Howe & French, Inc., one of the old established drug and chemical concerns of the east, operates a plant in Everett, another in Weymouth, and maintains its Boston office at 99 Broad Street. C. P. Seaverns is president, and M. S. Thompson, secretary and treasurer, and the concern has capital of $400,000.

The New England Tank & Tower Company manufactures agitator drives, direct connected drives, turbine mixers, stirrers, wood truck, and settling tanks, dye tubs, vats, and vacuum filter, pressure and elevated tanks, and in addition to standard lines designs and builds special agitating equipment. The concern maintains an engineering organization, and employs forty men. George E. Hall is president, Arthur E. Hall, vice president, and Warren O. Chace, secretary and treasurer.

The Sexton Can Company, of which Isaac E. Sexton is president and treasurer, and George A. Sexton, is vice president, manufactures tin and ash cans, tanks, and sheet metal specialties, employing 150 operatives in its Everett and Boston factories.

The Anderson Manufacturing Company, of which W. M. Vedder is president and treasurer, and O. F. Anderson, vice president, manufactures automobile accessories, and employs thirty operatives.

The factory of the Bankers' Lithograph Company, whose main headquarters are at 101 Milk Street, Boston, is located in Everett, where sixty hands are engaged in producing bank stationery, lithography, and printing. Joseph F. Woods is president and treasurer; Thomas V. Barry and Bruce Hobbs, vice presidents, and Clarence M. Gordon, secretary.

The Beaudry Company, Inc., manufactures power harnesses, and has capital of $200,000. Thirty hands are employed, and Archibald Parsons is president, C. H. Lerned, secretary, and Otto Abrahamson, treasurer, of the concern.

Wm. W. Bevan & Co. has long been engaged in manufacturing paper specialties for the confectionery and bakery trades, and in producing gummed labels and other specialties, employing thirty-five hands. William W. Bevan is president, E. S. Whitcomb, vice president, and Susan R. Bevan, treasurer.

The J. G. Blount Company, with capital of $45,000, employs fifty operatives in the manufacture of machine tools, J. G. Blount being president, and E. I. Blount, secretary and treasurer.

The Frank E. Boyd Company employs 100 hands in preparing and marketing dairy products, the concern having capital of $100,000. Frank E. Boyd is president and treasurer.

The Briggs-Maroney Company, Inc., capitalized for $1,000,000, manufactures paints and varnishes, John Briggs being president, George J. Blake, secretary, and James E. Maroney, treasurer.

The Builders' Iron & Steel Co. employs fifty men in fabricating steel and iron work, Howard P. Farmer being president, Herbert A. Buck, secretary, and William J. Hoffman, treasurer, of the corporation, which has capital of $35,500.

The Burnitol Manufacturing Company, of which H. B. Cranshaw is president and treasurer, and M. R. Creesy, secretary, employs thirty-five hands in the manufacture of sanitary paper specialties.

The Cutter Manufacturing Company employs seventy-five hands in the production of hardware specialties, H. B. Cranshaw being president and treasurer, and Morton R. Creesy, secretary.

The Delano Iron Foundry, owned by F. W. Delano, produces grey iron castings, and employs twenty-five hands.

The duPont E. I. De Nemours & Co., Inc., maintains its New England headquarters in Everett, where 150 operatives are employed in producing paints, varnishes, and stains, W. T. Banning being the New England manager.

The Engel Shoe Company, with capital of $300,000, employs 225 operatives in the manufacture of shoes, Karl Engel being president, and William E. Foster, secretary and treasurer.

The Everett Paper Box Company, with capital of $25,000, employs thirty operatives in the manufacture of paper boxes, E. L. Wood being president, C. G. Wood, secretary, and D. A. Westcott, treasurer.

Fellows & Company, Inc., employs seventy hands in the manufacture of wood products, garbage receivers and clothes dryers, the company having capital of $90,000. J. Leverett White is president, K. G. Fellows, secretary, and Frank C. Fellows, treasurer.

The Clinton E. Hobbs Company operated factories in Everett and Boston up to 1929, in the manufacture of chains and chain hoists, and has capital of $75,000. Edwin Hobbs is president and secretary, and H. H. Mason, treasurer. In 1929, this company erected a substantial addition to its local factory, and on July 1, of that year, consolidated the Boston and Everett units and removed its offices to the latter city.

The Kehew-Bradley Company, whose main headquarters are at 32 Purchase Street, Boston, manufactures oils and greases in its Everett factory. The company has capital of $99,000. George W. Brown is president, and Wayland H. Lewis, treasurer. This enterprise was established in Boston, in 1896, removed to Charlestown in 1912, and to its new plant in Everett the following year.

The Knowlton Iron Works Company, of which R. W. Knowlton is president, C. H. Cleaves, secretary, and C. B. Knowlton, treasurer, is engaged in producing ornamental and light iron work.

The Walter E. Lummus Company, whose main offce is at 148 State Street, Boston, and which has capital of $100,000, manufactures distilling and refining apparatus, at its Everett factory. Walter E. Lummus is president and treasurer.

The Market Forge Company, owned by Louis I. Beckwith, employs fifty operatives in fabricating iron and steel fixtures and equipment.

The New England Trunk Company employs 100 operatives in manufacturing trunks and suit cases, Frank R., Francis E., and Julius A. Bolz, and Frank H. Hilliard, constituting the partnership.

The Northern Box Company, with capital of $50,000, employs fifty hands in the production of paper boxes, George H. Grey being president, M. E. Grey, secretary, and Grace E. Baker, treasurer.

The Rice Chocolate Company employs sixty hands in producing chocolate coatings, the concern having capital of $228,000. F. D. Rice is president, and C. D. Rice, treasurer.

The Standard Mailing Machines Company, with capital of $100,000, manufactures envelope sealers and stamp affixers, and employs fifty operatives. F. M. Holmes is president, F. W. Storck, vice president, H. C. Hoskyns, secretary, and Elmore Andrews, treasurer.

The Tuttle Shoe Company is engaged in manufacturing women's shoes, and employs 100 operatives. The concern has capital of $100,000, and H. C. Tuttle is president and treasurer, O. H. Casavant, vice president, and W. E. Howe, secretary.

The P. R. Warren Company employs 100 operatives in the manufac-

ture of folding paper boxes, and has capital of $150,000. P. R. Warren is president, L. C. Guptil, secretary, and Everett A. Warren, treasurer.

White, Wilker & Company, Inc., manufactures leather athletic goods and sport wear, employing 100 operatives, and having capital of $98,952. H. S. White is president, and M. J. Wilker, treasurer.

The Paul C. Wolfer Company, with capital of $100,000, employs 250 operatives in the manufacture of shoes, Paul C. Wolfer being president and treasurer, and Clarence Newton, secretary.

Charles A. Spalding & Company manufactures woolen, worsted and silk sweaters, fancy knitted goods, mittens and gloves, and employs twenty-five operatives.

The Haley-Cate-Rockwood Company, Inc., manufactures novelty shoe and automobile trimmings in all kinds of leather, including finished and folded edges, pinkings, perforations, pipings, stays, and bindings. Arthur E. Haley is president, Norman G. Cate, vice president, and A. Waldo Rockwood, treasurer. The corporation has capital of $50,000 and employs fifty operatives.

CHAPTER XXXIX

MEDFORD

FAMOUS ALIKE FOR ITS SHIPS, RUM, CRACKERS AND BRICKS

In the years immediately following the Revolution, Medford annually manufactured about 4,000,000 brick, the industry having its local birth as early as 1630. Omitting brick making, ship-building and distilling, the town was not regarded in its early years as an industrial center. "Of manufacturing establishments, Medford has never had many, in the modern acceptation of the term," wrote a historian, in 1886. But he would be forced to revise his estimate had he lived in this, the second quarter of the twentieth century.

The low banks of the Mystic River fitted the town admirably for the building and launching of ships, and before 1800 the construction of vessels was not only the principal business of the town, but for three quarters of a century thereafter Medford-built craft were famous on the seven seas. Here some of the fleetest of the clipper ships were built and launched and in the seventy years of the heydey of the industry at least 567 vessels, of 272,124 aggregate tons, or an average of 490 tons per ship, and valued at $10,449,270, were launched from the ship yards of Medford, while the quantity of "Old Medford" rum, and of the famous Medford crackers, cannot be computed.

In 1875, a little more than half a century ago, the value of all the local manufactures was $688,095, and the total capital invested in industry was $393,500. Of the value, brick manufacture accounted for $122,500; rum, $64,000; carriages, $80,000; carpets and prints, $95,000; buttons, $40,000; bread, $45,000, and gold leaf, $45,000, there being employed at that time in the various establishments 452 males and 88 females.

As early as 1750 wooden heels were manufactured in Medford, by Samuel Reeves, while local potteries and tanneries were numerous at that period. The distilleries were famous up to 1830, and from that time on until this century, but one concern of this type, David Lawrence & Sons, operated there.

From 1735 to the days of the Eighteenth Amendment "Medford Rum" became as world-renowned as the Medford cracker, which was invented by the town's pioneer baker, Converse Francis, in 1799.

The Mystic Print Works was a successful concern for many years and the Medford Carpet Factory, established in 1866, frequently employed as many as 125 hands, until its removal in 1882. In 1880, the Brunswick Antimony Company was established and the Arctic Soda Water Company later absorbed by the Tufts concern, was one of the prominent manufacturing concerns, for many years.

THE F. W. RAUSKOLB COMPANY

The art of gold beating has existed for more than 3,000 years, as is clearly shown by the quaint pictorial Egyptian stone tablets excavated in recent years by scientific explorers, but it was not first developed in America until about 1815.

Gold beaters soon found their way to Boston, and in the cellars of

some of the old business houses of the Hub the sound of the hammer has since echoed.

The business now carried on by the F. W. Rauskolb Company, in Medford, was established in 1861, and until about fifteen years ago was carried on at 103 Arch Street, Boston.

The process of manufacture of gold leaf is carried on in much the same way as in the ancient days. The heavy hammer swung by the brawny arm still prevails, but improvements have been made in the initial rolling of the ingot and in the receptacles for holding the leaves during the process of beating.

In the Egyptian period it is presumed that gold was beaten with copper or hard wooden hammers, until the metal was in thin sheets. The use of a skin from the entrails of cattle had its inception at a much later period in Eastern Europe. In the early part of the seventeenth century the Parisian gold leaf makers are said to have beaten an ounce of gold into 1,600 leaves, which would cover about 105 square feet, the equivalent of an extra large parlor rug. In 1711 the pellicle discovered by the Germans was used in France and a much greater area was attained.

The first improvement of note in providing a more economical and easily handled gold leaf was "Transfer Gold" made by sticking the leaf to paper under pressure, this method being patented about 1885, and is still used to advantage by sign painters and dome gilders working in the open where if the ordinary loose leaf were used it would blow away.

The second invention was "Roll Gold," the leaf being laid on paper and rolled up, and cut to any desired width. These rolls have come into great demand and are used in practically all lines of work where gold leaf is used.

Until a comparatively few years ago the process of applying was laborious and the expense due to waste considerable, and although the possibilities of subsequent use were practically unlimited, it remained for F. W. Rauskolb to first recognize the scope of the field. He delved into exhaustive experiment to perfect its use, and as a result invented what is known as Patent Sized Gold Leaf, which completely revolutionized the process of stamping and led to the erection of a new plant, in Medford, to which additions have been made to accommodate an increasing business.

When first placed on the market stamping machines were unable to handle the new product at the maximum of efficiency. At the outset, tiny sheets about an inch by three inches were used; then a strip eleven and one-half inches by any width desired (up to three and three-quarters inches) was offered, to the end that impressions of varying length could be made without waste.

Step by step, under the direction of the inventor, Patent Sized Gold Leaf advanced into the field of perfection. From eleven and one-half inches it was next presented in a roll of ninety-five feet in length.

To improve the facilities in use, Mr. Rauskolb invented and perfected an automatic attachment for feeding the roll. At the same time, machinery companies interested devised and constructed machines that feed the leaf automatically, making it possible for shoe manufacturers to finish a perfect job of embossing in the packing room.

The present daily output of Patent Sized Leaf would form a precious strip of gold forty miles in length and six inches wide. At this rate, the output of a year would place a shining band of real gold, three inches wide, completely around the world.

The F. W. Rauskolb Company has capital of $150,000 and employs

fifty operatives. H. L. Boutwell is president and secretary, F. A. Rauskolb, vice president, and Fred H. Young, treasurer.

THE WELLMAN COMPANY

In the early history of the rubber boot and shoe manufacturing industry all soles were cut by hand in order that the operator might obtain the proper bevel by cutting the stock with the knife held at an angle.

Willard F. Wellman believed it possible to obtain the same result through the medium of a machine, whose movements would simulate the action of the human arm as it functions in the elbow and wrist motions. He realized that the necessity of cutting soles with a beveled edge could scarcely be obviated, due to the fact that the thin edge of the bevel is more readily attached to the upper in the manufacture of the rubber shoe.

On February 18, 1888, the Wellman Company was organized to market the new invention, and it suffered from the difficulties encountered by any concern that attempts to bring into use an untried machine. There was prejudice against the machine method, doubts as to its efficiency over the hand process, and as the first few machines were too light for the work, radical changes became necessary before factories could depend upon them to cut the sheeted stock without undue vibration.

The first successful machine was delivered to the factory of the Boston Rubber Shoe Company, in Melrose, April 11, 1891, and subsequently the Wellman Company acquired the patent rights to the Patten and the Anderson machines, both of which operated in a similar manner to the original Wellman invention; and in the intervening years the devices have been brought to a high degree of perfection. They are now in operation in practically all rubber shoe manufacturing concerns in America, as well as in Australia, Poland, Latvia, Sweden, Czecho-Slovakia, France, Great Britain, Germany, Finland and Latin America, and to a large extent throughout Canada, while occasional sales are made in Japan, Singapore, and Mexico. Wherever sole cutting machines are used the names of the Wellman Company and the City of Medford go hand in hand, because only there is the source of these devices.

H. P. Ballard is president and treasurer, and L. H. Goodhue, secretary of the corporation, which has capital of $120,000.

WILMOT H. SIMONSON

The business carried on under the name of Wilmot H. Simonson, now located at 54-56 Fulton Street, was established in October, 1911, in a small but convenient shed attached to the rear of the house in which Mr. Simonson and his family lived, at 21 Everett Street.

At the outset only two items were manufactured and sold to the soda fountain trade and ice cream manufacturers under the trade name of Lemonstok and Orangestok. Later on Lemon Py-Products, Chocolate Py-Products and Cocoanut Py-Products and the now well known brand of Old Medford Fruit Syrups were added and are known to the drug store and grocery trades as Old Medford Lime & Lemonade, Orange-Lemonade and Punch.

The business grew steadily and in 1916 it became necessary to move to larger quarters. The present location was secured, and in a year the floor space was trebled.

About four years after the factory had been enlarged, Mr. Simonson purchased the property on which was located another building and this was made a part of the manufacturing plant.

MEDFORD'S OTHER INDUSTRIES

In 1928, the New England Bedding Company bought the property belonging to the Jackson & Newton Company, consisting of about 150,000 feet of floor space, and about four acres of land, having an assessed valuation of $250,000, and a large industry, employing between one hundred and fifty and two hundred hands, has been added to the manufacturing enterprises of the city, the product of the concern being cotton felt. Harry Mintz is president, Joseph Berkowitz, secretary, and Morris Feldman, treasurer.

In October, 1927, the business formerly carried on by the Champlin & Hobbs Box Company was acquired by William H. Champlin, Inc., which concern has capital stock of $250,000 and employs 200 men in the manufacture of wooden boxes, of the nailed, locked corner, wire-bound and shook types, and also produces shavings, sawdust, kindling wood, and excelsior, the annual sales approximating $1,000,000. William H. Champlin is president and treasurer of the new corporation, which operates a modern plant, adjacent to the Revere Beach parkway as William H. Champlin, Inc.

From the very beginning of the radio industry, Medford has been known among the "fans" as the seat of the Medford Hillside station, which was established by the Amrad Corporation, one of the pioneers in the manufacture of radio apparatus. The concern has capital of $152,000 and employs 400 operatives. Major J. E. Hahn is president, Lewis M. Crosley secretary and Powel Crosley, Jr., treasurer.

The New England Brick Company, whose Boston headquarters are at 183 Devonshire Street, operates one of its three Massachusetts plants in Medford.

Charles E. Thomann, whose work in the field of developing nonferrous castings has been notable, is at the head of the Thomann Bronze & Brass Foundry, Inc., which employs twenty-five operatives in producing castings of that type. Albert Thomann is treasurer, and William Thomann, superintendent.

One of the city's prominent industries is The Warner & Childs Co., Inc., which has capital of $1,250,000 and is engaged in the manufacture of corrugated boxes. R. M. Taylor is president and treasurer, and L. M. Taylor is secretary of the corporation.

Alden W. Elbridge Teel, as E. Teel & Company, employ seventy-five men in the manufacture of wagon and commercial auto bodies.

The Toppan Boat & Engine Company, of which A. W. Toppan is president and treasurer, and H. M. Lewis, vice president, is engaged in the manufacture of boats and launches.

The plant of the Oliver Whyte Company, whose headquarters are at 73 Cornhill, Boston, is located, in Medford. Fifty hands are employed in the production of wire work, E. D. Small, being president, and T. E. Jordan, treasurer.

In 1927 the total value of all products manufactured in the sixty-one industrial establishments of Medford was $6,514,556, the value of stock and materials used was $3,322,389, and 1,181 employees carried on the payrolls receiving $1,380,704 in wages.

The principal products that year were paper boxes, electrical apparatus and wooden packing cases.

In 1921 Medford had forty-three manufacturing plants and six years later the total had risen to sixty-one, with aggregate capital of $3,924,798.

CHAPTER XL

WALTHAM

"THE WATCH CITY" OF THE UNIVERSE

In the spring of 1632, Governor Winthrop, of the Massachusetts Bay Colony, cut a trail through the woods some eleven or twelve miles to the west of Boston, and recorded in his "Journal" that this was probably as far out as a road would ever have to be built—an historical note which is the subject of a beautiful mural decoration in the North Junior High School in the city of Waltham. On the spot in that municipality where that trail ended there now stands a sign post directing the motorist to New York, for that country path grew into the Boston Post Road, which was for years the main artery of travel between the two great North Atlantic ports.

That even governors may sometimes err, it is perhaps pertinent to record in this tercentenary year of the founding of the Massachusetts Bay Colony that if Governor Winthrop's road now has an end, it will be found somewhere on the West Coast where the waters of the mighty Pacific kiss the glittering sands of the Golden Gate.

While the incorporation of Waltham as a town in 1738 was a momentous event in the history of the municipality, it was not until the establishment of a paper mill there in 1796 that it became anything more than a country village.

A CITY OF DIVERSIFIED INDUSTRIES

Unlike so many Massachusetts cities and towns which depend almost exclusively on one industry for their prosperity, Waltham has a wide diversity of mercantile and manufacturing interests and consequently does not suffer from the periodic slumps that affect a municipality with only one industry for its main support.

While often familiarly called "The Watch City" because for years the making of fine watches was its principal industry, Waltham now has 115 industrial plants making a great variety of products. Besides watches and fine cotton goods, the city manufactures worsteds, machinery of many types, paper bags and wrapping paper, fibre products, knit goods, dials, buttons, fine steel tools, and other products.

In the early days the Charles River, with its never-failing source of water-power, drew pioneer manufacturers to the town.

It was here, in 1788, that John Boies, son of the pioneer paper manufacturer, of Milton, constructed a dam on the Charles River, in Waltham, and built a paper mill, which was soon followed by similar plants at the eastern and western boundaries of the town, the paper mill enterprise set up by Gov. Christopher Gore, who served the Commonwealth as its chief executive, in 1809, having been established about 1794. This plant was sold by him to the Waltham Cotton & Woolen Company in 1810.

In 1801, Nathan Upham, an employee of John Boies, built another paper mill on the Waltham side of Stony Brook, near the river, in the extreme western part of the town. This business has been conducted by

several owners, including William Parker, Amos Whitney, John and William Sawyer, John M. Gibbs, John and Steven Roberts, John Roberts & Son Co., the Asbestos Protective Metal Company, the Charles River Paper Company, and the Stony Brook Paper Company, which now operates the plant. In this mill, while under the Roberts ownership, the first tar paper produced in the country was made about 1861 and, in 1870, the first sheet of asbestos paper manufactured was produced here.

Five years after the Waltham Cotton and Woolen Company acquired the Governor Gore paper mill, the concern had nearly 2,000 operatives in its cotton unit, and 380 in the woolen department, with four jennies, two jacks, and fourteen looms. Most of the weaving was done outside the factory, as was the custom at that period.

THE 110-YEARS-OLD WALTHAM BLEACHERY

This plant was acquired by the Boston Manufacturing Company and was torn down, and a bleachery erected in its stead, in 1820, which was originally designed for use by the new corporation, but it eventually built up an independent business that extended all over New England, and even beyond the geographical borders of this section.

For 110 years the Waltham Bleachery and Dye Works has prospered and grown, having a capacity today of 25 tons, and employing more than 300 hands in its up-to-date plant. The concern specializes on book cloths, shoe linings, and ducks of all kinds. It has capital of $300,000, and S. L. Kaplan is president, and Reba Paeff, treasurer.

THE BOSTON MANUFACTURING COMPANY

The early history of the Boston Manufacturing Company is treated in the chapter of this work devoted to the rise and development of the textile industry in Massachusetts, but in the intervening years since 1813, new mills have been added, steam has been utilized in place of water power, and in 1852 the first wide sheetings ever manufactured in America came off the company's looms. An imitation of India cloth at one period constituted the products, while hosiery, underwear, the better types of cotton fabrics, and finally the famous Gilbrae cotton ginghams, chambrays and rayons were produced.

The concern has capital of $2,100,000 and operates 2,000 looms, whose daily capacity is 30 miles of cotton fabrics. The great age of this concern has not affected its virility, as under its present management it holds rank as being one of the most progressive cotton textile units operating in Massachusetts.

This fact was further emphasized, when in the spring of 1929, an airplane left Boston carrying a shipment of the company's newest creations in print fabrics, and landed the goods in San Francisco, two days later, thereby making it possible for the Boston Manufacturing Company to exhibit its products on the Atlantic and Pacific coasts simultaneously.

These fabrics, featuring a modernization of the hand-block printing methods in vogue more than a century ago, when the corporation was born, were examples of the novel commodities now being turned out by Massachusetts textile concerns.

Compared with seven days by express and from three weeks to for[illegible] days by freight, the airplane service of two days gives evidence that the officials of this corporation are alive to the changing trend of the times.

Eleven hundred operatives are employed at the Waltham plant, and

Robert Amory is president, James H. Whitehead, treasurer, and C. F. Allen, secretary, of the corporation.

Daniel Emerson began blacksmithing in Waltham in 1813, attracted by the establishment of the cotton mills. He later built heavy wagons, employing at one time about twenty men, and he sold his vehicles and tools as far away as Cuba, Mexico and South America. One order for caissons for artillery was filled for the Turkish Government.

It was in Waltham that one of the country's first chemical plants was established, in 1819, which continued operations for eight years.

A century ago A. T. Stearns entered the lumber industry, in Waltham, the concern being taken over later by Francis Buttrick, who formed the Buttrick Lumber Company.

In 1844, R. P. Davis established an iron foundry, which, in 1860, passed into the hands of Frederick J. Davis and John R. Farnum, under the firm name of Davis & Farnum. The company made a specialty of hoisting machinery, high-test valves and machine tool castings, and at one period of its existence was included in the local concerns that employed several hundred hands.

CRAYON MANUFACTURE FIRST STARTED HERE

About 1845, Dr. Francis Field, a local dentist, invented a process of moulding chalk into crayons and produced small quantities in his own home, but did not market the commodity to any great extent. In 1850, Zenas Parmenter was the prime mover in forming the firm of Parmenter, Powers & Powell for the purpose of making crayons by Field's process. When Powers and Powell retired, A. H. Walker entered the partnership, and the firm of Parmenter & Walker carried on the business successfully for many years, receiving a medal for their product at the Centennial Exposition, in 1876. A few years later the name was changed to the Parmenter Crayon Company, and in 1890 it merged with the Western Crayon Company and the Cowdrey Crayon Company, to form the American Crayon Company, with factories in Waltham and Sandusky, Ohio. About 1920 the Waltham factory was abandoned.

THE WALTHAM WATCH COMPANY

Aaron L. Dennison, one of the founders of the present-day Dennison Manufacturing Company, whose early career is treated in the chapter devoted to the manufacturing industries of Framingham, turned his thoughts to the dream of his youth—the manufacture of watches on the so-called interchangeable system, after he had started his father, Col. Andrew Dennison, and his brother, Eliphalet W. Dennison, on their careers as producers of jewel boxes.

As early as 1846 Aaron L. Dennison predicted that within twenty years thereafter watches would be manufactured in this country with the same expeditious system and perfection that then attended the production of firearms in the Springfield armory.

In 1849, his friend, Edward Howard, consulted Dennison on the subject of engaging in the manufacture of steam fire engines, but this suggestion found no response. On the other hand, Dennison soon convinced Howard that the manufacture of watches by machinery offered a better return and immediately they began a search for a capitalist to back them in the venture. They found him in Samuel Curtis, of Boston, who provided $20,000, while Howard's partner, David P. Davis, associated with him in the clock and scale business, also became financially interested.

Howard was at the time a member of the firm of Howard & Davis, both partners being pupils of the celebrated Willards, manufacturers of fine clocks and gold standard balances.

While Dennison was sent to England to observe what was transpiring in the watch making districts there, Howard began the erection of the first American watch factory, in Roxbury. The building was completed in 1851 and the first watches were placed on the market two years later.

It was originally proposed to make eight-day watches exclusively, but this plan was found unsatisfactory, and the manufacture of thirty-hour timepieces was decided upon.

The original name—Warren Manufacturing Company—was adopted to conceal the nature of the business, and when production was sufficiently advanced to warrant placing the watches on the market the corporation was changed to the Waltham Improvement Company and then to the Boston Watch Company.

The original factory was found to be unsuited to the work, and, in 1854, a site was selected on the Charles River, in Waltham, where a large plant was built, but the financial outlay for buildings, tools, and machinery was greater than the available capital warranted, and three years later the assets passed into the hands of Appleton, Tracy & Company, who carried on the business for two years or more, when it was incorporated as the American Watch Company, the name being changed later to the Waltham Watch Company.

The new owners employed Dennison until 1861 when he disagreed with some of the policies of the company, and during the next twelve years friends who had confidence in his inventive and mechanical abilities assisted him in establishing three different factories, but due to lack of capital, none of these succeeded.

In 1874, when sixty-two years of age, he set up in Birmingham, England, a factory to supply watch cases to the Waltham and Elgin Watch Companies and formed the Dennison Watch Case Company, which he operated until his death, in 1895, at the age of eighty-five years.

Prior to the advent of the Boston Watch Company, of Roxbury, in 1849, the manufacture of watches, in the modern sense of the term, and by machinery, was not carried on. The American watchmakers of the Colonial period followed in the footsteps of the Swiss and English craftsmen of that era, and as a general proposition the parts of a timepiece were produced and assembled by a single artisan.

It was not until the advent of the industrial revolution that the division of labor was introduced, and it was in Massachusetts that leadership was brought about in applying the factory system to the manufacture of watches.

Growth was slow, as a demand for timekeepers had to be created.

There seems to be some reason to believe that Messrs. Dennison and Howard had learned of the success that followed the invention by Eli Whitney, of cotton gin fame, of the machinery he had perfected at the Springfield Armory, whereby the production of rifles by the use of standardized interchangeable parts had been vastly increased, for it is evident that this principle was the fundamental factor they applied to the manufacture of watches under the factory system.

They spent four years in designing and building the machinery to create the first watch movements. The business was removed from Roxbury to Waltham for the primary purpose of escaping the dust and vibration incident to city traffic.

BRINGING ORDER OUT OF CHAOS

Royal E. Robbins, of the Robbins & Appleton Company, watch importers of New York City and Boston, assumed charge of the moribund Waltham enterprise, and, as treasurer of the new corporation, which had been formed in 1857, under the name of the American Watch Company, brought order out of chaos.

In 1885 the corporate name was changed to the American Waltham Watch Company and during the first decade of the present century, the corporate name of Waltham Watch Company was adopted.

The first and most important task of Mr. Robbins and his associates was to develop new machines and processes for the manufacture of the various parts that enter into the fabrication of a watch. Simplification of the mechanism was the great desideratum. Many parts were found to be superfluous and were eliminated and by the time the Centennial Exposition of 1876 rolled around experts testified that fully three-fourths of the parts which at that time were employed by English watchmakers had disappeared entirely from American watch construction.

It is quite significant that in the field of watch production, the adoption of the machine process of manufacture had proved to be peculiarly adapted to the making of parts for watches, since absolute precision was the prime essential, and in this development the Waltham Watch Company and its corporate predecessors have led the American field. The construction of the most simplified movements commensurate with accuracy and reliability of performance has been the constant aim of its inventors and artisans.

Furthermore it was the sponsor of the numerous watch, watch-tool, watchmaking and watch-part companies that have come into being in this state, and throughout the country, during the past seventy years. The E. Howard Watch & Clock Company, founded in 1857, the National Watch Company, of Elgin, Ill., established in 1864; the New York Watch Company, founded in 1867; the Illinois-Springfield Watch Company, created in 1869, and the American Watch-Tool Company, established in 1870 —constitute a few of the examples of successful concerns that owe their existence, in some degree at least, to the Waltham Watch Company.

When Messrs. Howard and Dennison began in 1849 to work out the plan of manufacturing watches by the factory system, they found that the dials, jewels, and many other parts entering into the completed watch could be secured only by importing them from Europe.

Watch dial making, watch gilding and watch jeweling were processes which at that period were practically unknown in America, and, moreover, these operations had always been performed by hand. Therefore it was necessary to develop machines capable of turning out every part of a watch.

There seems to be no evidence of the creation of a watch handmaking department in the plant of the Waltham Watch Company prior to 1876, and presumably this concern and all others in America had been dependent from 1849 to at least 1868, when Messrs. Goodell & Winn began the manufacture of watch-hands, upon the imported articles.

It is certain that from 1865 to 1867, the Waltham Company experienced great difficulty in obtaining an adequate supply of watch-hands, due to post-war conditions in the import field.

It is difficult to conceive the skill and accuracy required in the production of Waltham watches, where some of the parts are so fine that they have to be handled in wax and assembled under powerful microscopes.

The company maintains its own school for training employees to become skilled watchmakers.

When operating at capacity the Waltham plant employs 3,000 men and women.

The corporation has capital of $1,700,00 7 per cent prior preferred, $5,000,000 6 per cent preferred, and 95,000 shares of no par value common stock.

F. C. Dumaine is president and treasurer, E. C. Fitch, vice president, W. P. Fiske, clerk, and F. C. Dumaine, Jr., assistant treasurer, of the corporation.

THE FIRST KEROSENE OIL WAS PRODUCED IN WALTHAM

In 1852 or 1853, Luther Atwood erected a building where he utilized gas tar, and produced coal tar benzole, naphtha, dead oils and pitches, the plant being generally known as the "Tar Factory." Here, Luther and William Atwood, in 1855, first successfully distilled kerosene oil and made the commodity available for household use.

Stratton Brothers had a factory on the south side of the river for the manufacture of furniture, commonly called the Bedstead Factory. The date it was built has not been ascertained, but in 1857 they employed thirty men and were producing a large quantity of furniture of various kinds, but the business was discontinued not many years later.

THE WALTHAM FOUNDRY COMPANY

The Waltham Foundry Company, established in 1870, was acquired in 1885 by Anthony A. Curtin and J. Milton Kilgour, at which time the concern was incorporated. In 1920 Mr. Curtin bought Mr. Kilgour's interest, and, in 1923, became president and treasurer. The daily capacity of the plant is 24,000 pounds of castings, the company occupying three large buildings, one being 110 by 40 feet, and the other two, 90 by 50 feet each. The concern specializes on watch machinery castings, hoisting machinery, high-test valve work and machine tool castings.

Thomas I. Curtin is president, treasurer and secretary of the concern.

SOME ENTERPRISES ESTABLISHED IN THE SEVENTIES

In 1872, George F. Ballou and John E. Whitcomb, began the manufacture of watch repairers' lathes, later known as "Whitcomb Lathes." In 1874 Mr. Ballou retired and two years later, Ambrose Webster joined with Mr. Whitcomb and Henry Fisher in forming the American Watch Tool Company, and commenced a thriving business in the manufacture of these lathes, also machinists' bench lathes, and watch factory machinery. The concern acquired a highly skilled corps of workmen and built up a reputation second to none for the manufacture of small precision machinery. Following the deaths of Mr. Webster in 1893 and of Mr. Whitcomb in 1906, the company changed management several times and in 1918 the business was liquidated.

In 1876 Caleb Hopkins Van Norman began the manufacture of watch repairers' and machinists' lathes, in Waltham, under the name of the Hopkins Watch Tool Company. In 1883 the name was changed to the Waltham Watch Tool Company, the right to the use of the name being secured from Charles V. Woerd and his associates. About 1890, the business was moved to Springfield, and later the name was changed to the Van Norman Machine Tool Company, under which designation it now operates.

WALTHAM CONCERNS ESTABLISHED IN THE EIGHTIES

In 1880, Henry Richardson began local experiments in the manufacture of emery wheels adapted to the grinding of watch parts, and today not only are regular vitreous and silicate processed wheels made in the city, but those based on an elastic process that produces wheels that are flexible and of advantage wherever finer buffing and polishing operations are carried on, are now manuactured locally.

The Waltham Grinding Wheel Company was founded in 1880, and became one of the pioneers in its field. It has capital of $90,000, and employs seventy-five operatives. F. C. Tebbetts is president, and M. F. Cunningham, treasurer.

In 1883, Charles V. Woerd left the employ of the American Watch Company and began the manufacture of special machinery under the name of the Waltham Watch Tool Company. Later in the same year, he, with Granville Nutting, Chandler Edgecombe, Charles V. Woerd, Jr., and Thomas B. Eaton, incorporated under the name of Waltham Watch Company and a factory was built in 1883. As the result of a suit instituted by the American Watch Company, the concern was forbidden to use the name of Waltham and took that of United States Watch Company. E. C. Hammer later became the principal owner and in 1901 the business was sold to the Keystone Watch Case Company of Riverside, N. J., but it continued to operate under the same name as before. The Suffolk Watch Company of Waltham, purchased by the Keystone Company at the same time was consolidated with it. In 1903 the watch department of the E. Howard Watch and Clock Company of Boston was also purchased, moved to Waltham to the United States factory, and the combined companies have since been operated by the Keystone Watch Case Company under the name of E. Howard Watch Works.

In 1896 Edward A. Locke formed the Columbia Watch Company and began the manufacture of watches in Waltham. The company was reorganized about 1900 and took the name of Suffolk Watch Company, and in 1901 it was sold to the Keystone Watch Case Company.

The corporation employs upwards of 125 operatives in its Waltham plant, where watch movements are fabricated. It has capital of $6,000,000.

THE LOCKWOOD BRACKETT COMPANY

The United States center of the castile soap importing business lies in the port of Boston, as do so many raw materials and commodities, which enter largely into manufacture and distribution in this country.

At the large distributing plant of the Lockwood Brackett Company, located on the irons of the Boston & Maine Railroad Company at Waltham, the soap is received in large crude slabs, which come to Boston by ships from old Castile, in Spain, where the olive oil from which the commodity is made, is a native product. Here they are transformed into toilet sized cakes, into granulated castile for widely used processes of manufacture, as well as for toilet use, and into powdered, dustulated, and liquid forms.

The Lockwood Brackett Company is the successor of a business established in Spain, in 1806, and in Boston, in 1885, and markets its products in every part of the United States, as well as exporting them to many foreign lands. The concern also imports, packs and distributes olive oil to all parts of this country, and maintains a sales office in New York City.

Housed in a magnificent steel and concrete structure erected a few years ago, the company prides itself upon the purity and quality of its famous products. T. R. Lockwood is president of the corporation.

THE JUDSON L. THOMSON COMPANY

Another of the large and prosperous Massachusetts manufacturing concerns transplanted from another state to this Commonwealth is the Judson L. Thomson Manufacturing Company, which today has the distinction of being one of the largest concerns in the world for the manufacture of bifurcated and tubular rivets, metal specialties and rivet setting machines.

In 1890, it removed from Syracuse, N. Y., where it had been established ten years before, and located at the Roberts station of the Boston & Maine Railroad.

The concern formerly operated a large manufacturing plant, in England, but as the domestic business reached such large proportions as to demand frequent additions to the Waltham factory, the English unit was sold.

Over 550 hands are constantly employed. Alfred H. Sawyer is president, and W. P. Bartel, treasurer and secretary, of this corporation, which has capital of $1,000,000.

Since the erection of the main building in 1890 extensions and improvements have been continuous until today the structures, all of brick and cement, and of the most modern type, constitute one of the largest manufacturing plants in Middlesex County. One of the biggest additions to the works was erected in 1929—a brick and cast stone structure, 202 by 50 feet, with a wing 21 by 40 feet.

Innumerable automatic machines, the invention of Mr. Thomson, and others, perform their work with more rapidity and much greater accuracy than human intelligence could hope to attain, and these devices, the patents upon which are owned and controlled by the company, account for much of its success.

In the manufacture of bifurcated rivets the wire, brass and steel is fed to automatic machines from the coil, which forms the head and cuts them the required length. These machines operate at a speed of from 60 to 120 revolutions per minute. From these the partially formed rivets are conveyed to automatic machines for the slotting process. They are then placed in tumbling barrels to make them smooth. After going through this operation they go to the sorting machines, which operate with the greatest accuracy, nothing but rivets which are slotted being able to pass through these machines. All others are returned to the slotting machines for completion. They are then ready for the plating or enameling process, after which they are taken to the inspection room, then to the packing and shipping departments for distribution to various parts of the world. Tubular rivets go through much the same process, with the exception that they are put through automatic drilling machines to make them hollow. In the manufacture of shoe hooks, outside prong rivets and buckles, sheet brass and steel are used as occasion requires, passing through the different automatic machines until they are formed, after which they are sent to their respective finishing departments for enameling or plating of nickel or silver or plain brass finish, and finally find their way to the packing and shipping departments.

The company manufactures a varied line, including bifurcated outside prong and tubular rivets used in the manufacture of trunks, bags, boxes,

suit cases, belts, straps, horse collars, overalls, auto tires and manufacturing generally; also sweat pad hooks, harness spots, shoe hooks and other metal specialties. Automatic foot and power machines for the handling of every class of their rivets used in the different industries are supplied to manufacturers.

About fifteen years ago an automatic machine was evolved by the concern, known as the American Lacing Hook Machine, designed especially for the boot and shoe manufacturer. The rapidity of operation of this machine is marvelous. Working at a speed of 400 revolutions per minute it automatically spaces and applies shoe hooks in groups of two, three or more.

Well equipped machine and pattern making shops are important features of the plant. These shops have a force of skilled mechanics engaged in finishing rivet setting machinery and building new automatic machines, as well as as patterns for new inventions. Adjoining the machine shop is the box factory which manufactures all the boxes and containers for the packing of the company's products. The process used for hardening rivet heads such as are used on the tread of automobile tires, the method of placing the enamel on shoe hooks, the machines for the placing of shoe hooks on thin flat metal strips ready for the oven, and the automatic machines used for capping rivets with brass, celluloid and other materials are most ingenious and almost uncanny.

A large amount of raw material is kept on hand at all times, and it is not unusual to have in stock 1,000 tons or more of steel and brass wire of various sizes, as well as a large quantity of sheet brass and steel.

The stock room bins have 200,000,000 rivets in store at all times.

In 1896, Frank E. Randall began the manufacture of watchmakers' tools and gauges, and was the first to introduce the use of dial gauges into U. S. Government work and in paper mills. In the intervening years he has acquired a nation-wide reputation in this field.

B. C. AMES & COMPANY

In 1898, Bliss C. Ames and John Alcorn formed the firm of Alcorn & Ames, and started the manufacture of precision tools, micrometer dial gauges, and similar tools, the concern being incorporated in 1922 as the B. C. Ames Company, Inc., when the senior Mr. Ames retired, and turned over the management to his sons, Warren and Ira G., the former being president and general manager, and the latter treasurer of the concern, which employs 150 hands in its own modern concrete factory.

With an experience of many years as a tool-maker, Bliss C. Ames invented and produced a tool-makers' bench table, which for thirty years has stood unrivaled. The concern he founded was the first to place on the market the straight bearing bench lathe of modern construction, as well as the low angle chuck, and while others have followed in the production of these types, the Ames inventions hold the market demand. Designing and inventing the Ames dial micrometer gauges which are sold throughout the world to scientific laboratories and machine shops, these devices have become recognized as the most accurate in existence.

THE WALTHAM MACHINE WORKS

A little more than thirty years ago, Benjamin F. Ellis was employed as a tool and die maker, and Edmund L. Sanderson, as a mechanical draughtsman, in the plant of the American Watch Tool Company, of Waltham, a concern that has since liquidated, and in August, 1898, they

formed a partnership under the name of the Waltham Machine Works, and began business in a small wooden building, which today is used for special tool making and experimental work, devoting their activities at first to subpresses and dies, but soon adding the designing and manufacture of special machinery of small size, but of high grade. As the firm prospered, a moderate sized brick plant was erected, and the concern developed a line of pinion, gear cutting and milling machines for threading, which are in use in nearly all parts of the world today where such machinery is required, particularly in nearly all the watch factories of the United States, and in many of those in Germany and Switzerland. The firm has also developed machines for factories engaged in making small parts such as meters, gauges, typewriters, etc. Within the past few years the concern has been building up a cutter making department, specializing in cutters of small diameter, such as are used in its own machines and has designed and manufactured the clock type of cutters employed in watch and clock production. While the working force is not large, the artisans employed at the plant are far beyond the average machinists and tool makers in skill and experience.

Messrs. Ellis and Sanderson still continue the partnership formed thirty years ago and have helped give Waltham its pre-eminent position in the output of fine and accurate tool steel products.

THE POTTER PRESS, INC.

In Waltham, is located the Potter Press, the pioneer sales book organization, of New England, established in 1900.

Starting when the advantages of duplication by means of carbon paper were little appreciated, this company blazed a trail for thousands of merchants and manufacturers in the direction of economy in accounting.

Old-fashioned bookkeeping methods were those of drudgery. Business has always demanded a written record of transactions. By the use of duplicate records many of the annoyances of bookkeeping are avoided and today duplicate and triplicate sales books save a vast amount of copying as one writing makes three or four exact copies.

The Potter Press books and forms are used for buying and selling, and for requisitions and inventories. The company has standardized materials and sizes at a great saving to users. Its plant at Roberts Station, built in 1921, is a model brick and concrete structure and is equipped throughout with most modern machinery.

The Potter Press employs 200 operatives, in addition to which there are forty salesmen covering New England, eastern Pennsylvania, eastern New York and New Jersey.

C. W. Potter is president, F. J. V. Dakin, secretary, and L. F. Muther, treasurer, and the corporation has capital of $300,000.

SOME LOCAL TWENTIETH CENTURY ENTERPRISES

The Superior Corundum Wheel Company was organized in 1904 by Matthias F. Cunningham, and later erected its own factory, where as many as 115 men were employed in the production of grinding wheels. In 1919 Mr. Cunningham disposed of his interests to the International Abrasive Company. The Waltham factory was continued, the name being changed in 1925 to the Superior Grinding Wheel Company, but in 1928 the business was liquidated.

In 1907, W. H. Nichols began the manufacture of pumps, and later developed the Zenith Metering pump for the rayon industry, as well as

air tools, and machine parts. He now markets his products throughout the world, and employs fifty operatives.

R. A. Wilson and A. P. Wilson and others incorporated the Boston Pencil Pointer Company, in 1911, and began the manufacture of pencil pointers early the next year. R. A. Wilson later retired and E. C. Thompson with A. P. Wilson became the principal owners. The business prospered and at one time about 150 were employed. During the World War other work was carried on and at one time 300 operatives were on the payroll. In 1925 the business was sold to the C. Howard Hunt Pen Company and was moved to Camden, N. J.

In 1913 the Clayton Manufacturing Company was established, becoming incorporated in 1917, with capital of $50,000. It is engaged in the manufacture of woolen and cotton, and cotton and rayon underwear. Fifty hands are employed.

M. P. Clayton is president, W. H. Frye, secretary, and Edwin Clayton, treasurer.

THE NEW ENGLAND MICA COMPANY

The New England Mica Company was incorporated in 1917, and occupied at that time 7,500 square feet and employed about twenty-five hands. In 1920 the floor area was increased to 18,000 square feet and seventy-five employees were carried on the roll, and in 1926, in order to meet the demands of a rapidly growing business, the floor area was increased to 28,000 square feet. At that time there were about 100 employees, and at the present this total has been increased to 150. The entire floor area is devoted exclusively to the manufacture of built-up mica products, the company producing the very highest grade of material in its line. It retains chemical research and electrical engineering staffs which supervise all manufacture, and it is supplying all of the largest and most exacting users of mica products.

Still there are critics who assert that Massachusetts has built up no new enterprises in a generation, yet here is a concern that in a little over a decade has increased its manufacturing facilities almost 400 per cent.

The factory and main office are located at 66 Woerd Avenue. T. B. Plimpton is president, Edward Cooper, vice president, and C. G. Plimpton, treasurer and general manager. The corporation has capital of $300,000 and employs 100 hands.

SOME INDUSTRIES OF THE DECADE 1920-1930

In 1920, A. T. Sawyer established a local factory for the manufacture of worsted golf hose.

In 1922 the Belgian Spinning Company was incorporated, with capital of $60,000, and manufactures woolen, worsted and knitted yarns. D. A. Servais is president, and Philip Rubenstein, treasurer. The company employs seventy-five operatives and now has capital of $100,000.

In 1924, Arthur H. Paul and Francis C. Mann bought the business of the American Knitting Company and changed the name of the concern to American Knitting Mills Company, Mr. Paul becoming president and general manager, and Mr. Mann, treasurer and secretary. The manufacture of sweaters, bathing suits, jersey, novelty, and knit goods, is carried on in three buildings, and upwards of 100 hands are employed. The concern is capitalized for $90,000.

The Russell Box Company, whose main plant is in Chelsea, opened a branch factory, in Waltham, in 1925.

The Waltham Knitting Mill, owned by Alfred V. D'Angio, is engaged in the manufacture of men's, women's and children's bathing suits and sweaters.

In 1929, the Franco-New England Printing Corporation, the stock of which company is owned by the Boston Manufacturing Company, and the Nashua Manufacturing Company, was incorporated for the purpose of carrying on a general business of manufacturing, printing, coloring, steaming, drying, aging, finishing and otherwise treating all kinds of textile fibers and fabrics.

The officers are: president, John Cutter; treasurer and clerk, Arnold W. Hunnewell.

Printing machines of the new company were installed in the Waltham plant of the Boston Manufacturing Company.

THE PALMER ELECTRIC & MANUFACTURING COMPANY

In a plant at Kendall Square, Cambridge, there was evolved and manufactured the system of alternating current distribution, which was installed throughout Greater New York a few years ago, thereby securing to consumers a continuity of electrical service not previously possible except with direct current, and which provided to the distributor of electric energy an investment reduction of sixty per cent in the most important item of his distributing equipment—a saving that has since been shared in by consumers elsewhere.

So significant was another invention made at this Cambridge plant that the Underwriters' Laboratories of the National Board of Fire Underwriters established a new type of label—Classification AA—for the specific purpose of recognizing the advance in the electrical art made possible by the creation by Granville E. Palmer of an enclosed safety switch. Less than a quarter of a century ago, Mr. Palmer, who at that time was manager of the arc lamp department of the Pettingell-Andrews Company, of Boston, was, to use his own words, "forced to become an inventor in order to supply the demand of the Cambridge Electric Light Company for a safety system that would protect the citizens of Cambridge from the hazards at that time present in their street lighting system."

The safety system devised by him, and first used in Cambridge, later became a standard equipment of electrical companies throughout the country.

In 1911 the Pettingell-Andrews Company sold the manufacturing business which Mr. Palmer had developed and in which he held a substantial interest, to a Connecticut manufacturer, thus permitting him, as he afterward said "to realize his ambition to establish a Massachusetts industry of his own for the development and production of devices which would increase the safety and reliability of electrical energy distribution."

This, Mr. Palmer proceeded to do, with credit to Massachusetts and to himself inasmuch as the products of the Palmer Electric and Manufacturing Company have been recognized in a signal manner by the various organizations of this country whose duty it is to safeguard the public from accident and fire hazards. In the electrical industry a safety valve is necessary in every electrical service connection and the usual form of this safety valve is the well known fuse. As its replacement involves actual contact with the conductor and the possibility of its melting with explosive violence in the hands of the operator, if renewed when abnormal

conditions still prevail, Mr. Palmer developed a type of enclosed safety switch, now standard in many cities, in which the fuse carrier is necessarily disconnected from the conductor when exposed for handling and in which no live parts are accessible to the operator in replacing fuses.

The United States Bureau of Standards in its National Electrical Safety Code specifies the equivalent of Mr. Palmer's patented apparatus where fuses are accessible to inexperienced operators, while the Underwriters recognized the invention by establishing for it a higher classification than any previously existing.

Another product designed and manufactured by Mr. Palmer is the master switch, a device which forms a part of the standard equipment in the new mechanical switching exchanges of the Bell Telephone Company and whose function is to automatically insure that continuity of service which is so essential in the operation of a public utility.

Three years ago increasing business demanded larger quarters, and the concern removed from Cambridge to Waltham, where it has a fully-equipped plant, including a battery of stamping presses which turn out all of the metal stampings required for its various products, and a completely equipped die-making department. Machine tools, electric welding machines, a large assembling department, and engineering, testing, and drafting units, as well as large stock rooms, are included in the company's layout.

The corporation has capital of $250,000, and employs 125 operatives. Granville S. Palmer is president and treasurer, and Edward Gibbs, Jr., secretary of the corporation.

The B. Wolk Pattern Shop provides the link in the chain between the designing of a machine and the finished product, and with a plant excellently equipped, not only with machinery but with experience as well, Benjamin Wolk, a pattern maker of rare ability, serves local and vicinity manufacturers in solving their pattern problems, the company which he founded having a reputation and calls for its services far beyond the limits of Middlesex County.

OTHER WALTHAM CONCERNS OF TODAY

The Bettinger Enamel Corporation, with capital of $105,000 is engaged in the vitreous enameling of cast iron and sheet steel, and porcelain work, H. B. Bettinger being president, and George P. Davis, treasurer.

The Boston Brass Company capitalized for $20,000, employs forty operatives in the manufacture of plumbing supplies, Joseph A. Maynard being president and treasurer, and G. E. Maynard, secretary.

The Charles River Paper Company produces light weight chip and news board, card middles and specialty papers.

The City Brass Foundry specializes in brass, bronze, aluminum and copper castings.

W. D. Clement is engaged in the manufacture of watchmakers' lathes, and employs twenty-five operatives.

The Crescent Park Brass Foundry produces brass and bronze letters, railings, theater fittings, and castings, the concern being owned by George W. Thornburg. Benjamin Wolk and Mr. Thornburg also operate the Crescent Sign Company which specializes in traffic and direction signs.

One of Waltham's long established and unique manufactures is that of producing weather vanes. Charles W. Cushing is one of the few surviving producers of these hand wrought devices, and has attained an

enviable reputation for turning out not only original conceptions, but of manufacturing accurate vanes.

F. W. Derbyshire has long specialized in the manufacture of lathes, and his products are in demand in many parts of the United States.

C. F. Hathaway & Sons operate one of their food products plants, in Waltham.

The Housing Company, with capital of $500,000, employs eighty operatives in the production of architectural millwork, and in the manufacture of the Waltham system of ice cream delivery equipment, and has its main headquarters, at 40 Central Street, Boston. Albert Farwell Bemis is president, W. P. Fuller, vice president, H. R. Brigham, secretary, and Robert Bowser, treasurer.

C. M. and Frederick A. Howell, as partners, operate the firm of Charles M. Howell & Son, and employ 200 operatives in the manufacture of pearl buttons, the unit being one of the large enterprises of the city.

The International Counter Company employs fifty operatives in the manufacture of counters for shoes, having its Boston headquarters at 60 South Street. The concern has capital of $50,000. Harry B. Taplin is president, Lionel Malaguti, vice president and secretary, and Charles D. Malaguti, treasurer.

The Irrigation Headquarters, of which Charles O. Wilson is treasurer and manager, manufactures automatic rainmakers, irrigation systems, pumps, motors, and engines.

The O'Hara Waltham Company, with capital of $195,000, is engaged in the production of enameled dials and novelties, and employs 100 operatives. Eliot O'Hara is president, E. L. C. Clark, vice president, L. E. Lombard, secretary, and Skidmore O'Hara, treasurer.

The Perrine Quality Products Corporation manufactures storage batteries, the company maintaining Boston headquarters at 48 Cummington Street.

The Reliance Garnetting Mills, Inc., manufacture yarns. The corporation has capital of $90,000. D. A. Servais is president and Alfred Lambrette, treasurer.

The plant of the Riverside Paint & Varnish Company, of 86 Western Avenue, Boston, is located in Waltham, where paints and varnishes are manufactured. The concern has capital of $100,000, Walter S. Hughes being president, F. S. Litchfield, vice president, Greta C. Coleman, secretary, and Carrie W. Kurrelmeyer, treasurer. The concern manufactures a complete line of paints, varnishes, enamels and japans, for the industrial trade, as well as a special line of goods for master painters.

The Screw Machine Products Company is engaged in the manufacture of machine screws. K. W. Ahlstrand is president and treasurer.

The Specialty Automatic Machine Company, with capital of $99,000, employs thirty operatives in the manufacture of automatic paper box machinery. M. H. Sidebotham is president, W. B. Russell, secretary, H. M. Russell, treasurer, and L. E. La Bombard, general manager.

The Stark Tool Company employs seventy-five hands in the production of bench lathes, the concern having capital of $40,000. E. C. Potter is president and treasurer, F. T. Potter manager, and J. W. Martin, superintendent.

The A. W. Stephens Manufacturing Company, with capital of $25,000, produces advertising specialties, M. J. Vail being president and treasurer, and E. J. Herley, secretary.

The Sterling Fibre Company is engaged in the manufacture of carpet lining, furniture pads, cotton and wool comforters, and auto roof padding.

The Universal Safety Tread Company, which maintains a Boston office at 40 Court Street, manufactures aluminum and safety stair treads, at its Waltham factory. H. G. Chapin is president and treasurer, and J. Colby Bassett, secretary. The company has capital of $60,000.

The Wade Tool Company, owned by Walter H. Wade, employs sixty men in the manufacture of precision bench lathes, pinion and wheel cutters, small machinery and tools.

The Waltham Bag & Paper Company, of which Theodore E. Jewell is president, employs fifty hands in the manufacture of paper bags and envelopes for milliners.

The Waltham Chemical Company, of which concern Basile La Place is president and F. F. Martin is treasurer, is engaged in the production of pest exterminators.

The Waltham Horological School, owned by E. H. Swain, employs sixty operatives in the manufacture of watch materials, jewels and staffs.

The Waltham Screw Company employs seventy-five operatives in the manufacture of special screws, Edgar F. Viles being president and treasurer, and R. A. Morton, secretary.

W. C. Welch is president and treasurer, and C. L. Welch, secretary, of the Wm. C. Welsh Company, manufacturers of patent leather, and the concern employs ninety hands.

In 1927, commodities valued at $19,378,957 were manufactured in Waltham, a total of $4,354,485 greater than that of 1921.

The value of stock and materials used in manufacture was $6,088,547, the average number of wage earners employed was 5,652, to whom were paid $7,039,353.

CHAPTER XLI

MELROSE

PURVEYS BOSTON'S FAMOUS BAKED BEANS TO THE NATION

Notwithstanding the fact that Melrose has only a few more industries than her neighbor, Medford, yet, in 1927, the value of the products manufactured in them exceeded the Medford total by more than half a million dollars.

With capital of $3,163,108, the twenty-six manufacturing establishments of Melrose used, in 1927, stock and materials valued at $2,301,470, paid wages to 597 employees amounting to $770,465, and produced commodities valued at $4,659,140. In 1875, Melrose had thirteen small manufacturing establishments, which turned out, that year, products valued at $388,772.

Rubber boots and shoes constituted the principal products, the Melrose plant of the Boston Rubber Shoe Company, which was established in 1883, and is now owned by the United States Rubber Company, accounting for this fact. In 1929, the operations there were transferred to the Malden factory of the same company.

Next comes the manufacture and distribution of canned baked beans, the partnership of Friend Brothers, made up of Leslie A., Victor A., Robert and Walter A. Friend having made "Boston Baked Beans" famous from coast to coast during the first quarter of the twentieth century by evolving a process which has resulted in building up a business that affords employment to over 400 hands, and which necessitates in addition to the large plant operated in Melrose, the operation of branch factories, in Lowell, and Lynn and Malden.

The A. W. Chesterton Company, whose headquarters are at 64 India Street, Boston, employs forty operatives in its plant at Melrose, where flax and asbestos steam packings and wickings are produced. The company has capital of $50,000. A. W. Chesterton is president, George L. North, secretary, and Charles B. Devereaux, treasurer.

THE EMERSON APPARATUS COMPANY

In 1908 the Emerson Apparatus Company was established in Boston, to engage in the manufacture of the Emerson fuel calorimeter, a device designed and invented to determine the heat value of fuels, particularly coal and oil, and shortly after additional lines of industrial testing apparatus were developed, including the company's conditioning oven, to determine the moisture content of textile raw materials and materials in process, which consists of a drying oven, with weighing scales suitably mounted. The production of this apparatus released the American textile manufacturers from being forced to purchase these commodities abroad, all conditioning ovens having heretofore been produced in foreign countries. Four distinct types have been placed on the market by the Emerson concern, covering the cotton, woolen, silk and rayon branches of textile production.

Many types of special instruments and apparatus for the testing of textiles, oils, rubber, etc., have been evolved by the Emerson engineers, prominent among the products being the rubber aging apparatus designed by Messrs. Bierer and Davis, which has been universally adopted by the leading rubber industries for making aging tests of rubber compounds required in their line of manufacturing. This apparatus consists of a strong steel receptacle which is heated to a uniform temperature by the means of an electric oven or water bath, following which samples of rubber compounds to be aged are placed in the receptacle, in the presence of oxygen under pressure, and in a period ranging from twenty-four to forty-eight hours the rubber sample is aged in an amount equivalent to one or two years of natural aging, thus determining the probable efficiency of the compound. The company also manufactures metal specialties and in 1920 erected a factory, in Melrose, which it now occupies.

The officers are Charles J. Emerson, president and treasurer and Robert S. Emerson, secretary.

OTHER LOCAL ENTERPRISES

Emma E. Curtis & Company, a partnership made up of Emma E. Curtis and Amory R. Curtis, employs twenty-five hands in the manufacture of marshmallow creme.

In 1911 the Bosworth Mills, Inc., were incorporated under Massachusetts laws, with $50,000 preferred stock and 1,100 shares of no par common stock, and began the manufacture of low priced dresses for women under the name of "Boston Maid," soon becoming known as "The Ford of the Dress Industry" because of the systematic methods of production introduced by its progressive officers. Roy L. Bosworth is president and treasurer, and R. L. Bosworth, E. H. Bosworth and C. H. S. Merrill.

There was formed in Melrose about fifteen years ago the Wonder-Mist Polish Company, whose product is distributed from coast to coast and in forty-six foreign countries. Many plant enlargements have taken place since the company was formed, and in addition to the automobile trade, the product is largely used as a furniture polish and deodorizer. Some time ago the company brought out a polish for silver, nickel, brass, copper and aluminum, and for window washing. William H. Luckett is manager.

Marine compasses are manufactured by the Baker Compass Company, owned by H. M. Nash.

The Franklin Company, with capital of $800,000, employs 100 operatives in the manufacture of women's underwear and dresses, G. H. Abercrombie being president, and R. H. Sircom, treasurer.

The F. A. Hermann Company employs thirty-five hands in the manufacture of enameled and hand-painted jewelry, L. H. Smith being president, Wm. E. Waterhouse, secretary, and F. A. Hermann, treasurer.

The Libby Manufacturing Company, with capital of $10,000, employs thirty in the manufacture of jewelry, Edward W. Libby being president, and K. Hermann, treasurer.

CHAPTER XLII

WOBURN

THE TANNING CENTER OF MIDDLESEX COUNTY

As early as 1886, the fathers of 138 out of 241 children born in Woburn in the previous calendar year, were described as either tanners, curriers, cordwainers, or shoe manufacturers, thus indicating that for sixty years or more artificers in leather have predominated in the municipality.

John and Francis Wyman, two of the early settlers, were tanners, while Gersham Flagg, who came to Woburn as early as 1668, was also a tanner by trade. During King Phillip's War, the taxes of the town were partly paid in shoes, manufactured probably from leather prepared by the above named and other citizens.

Then followed Jonathan Wyman, a grandson of John, David Cummings, who migrated from Topsfield, Jonathan Tidd, and Gen. Abijah Thompson, the latter beginning his tanning enterprise in 1814.

In 1837, seventy-seven men were employed in Woburn's tanneries, and in 1850 thirteen local concerns were manufacturing leather, while two others were producing boots.

The real expansion of the leather industry of Woburn began during the Civil War period, and on May 1, 1865, there were in active operation in the town twenty-one tanning and currying establishments, whose annual products were valued at $1,723,450, and employing 554 operatives, with four other establishments turning out patent and enameled leather valued at $285,550, in which fifty-eight hands were employed.

The same year 758 pairs of boots and 160,145 pairs of shoes were manufactured there by 308 men and women, the total value of these products being $254,190, only Hopkinton and Holliston, of all the Middlesex County towns, manufacturing boots and shoes of greater value than those turned out in Woburn.

By a singular coincidence the number of local industrial establishments engaged in the tanning, currying, and finishing of leather, was exactly the same as the total of 1865—sixty-two years before—but instead of the meagre value of products, amounting to $1,723,450, they turned out in the latter year leather valued at $10,021,485, figures which do not seem to indicate an extensive decline in this, the principal industry of the city, whose operations represented 62.5 per cent of the value of all local manufactures in 1927.

The 554 operatives of 1865 had increased to 1,379 despite the fact that in the sixty-two year period wonderful advances had been made in the art of producing leather by machinery.

To these 1,375 workers were paid $2,065,998 in wages, in 1927, and the twenty-one leather concerns used stock and materials valued at $5,917,172.

The fifty-one industries operating in Woburn, in 1927, manufactured products having an aggregate value of $15,779,050, and altogether the stock and materials used were valued at $8,651,093, while 2,207 employees received $3,121,059 in wages that year.

John Cummings, who was born in Woburn in 1785, and died there in

1867, probably taught more young men the art of tanning than any other leather manufacturer in Massachusetts.

THE TOLMAN-FOX CORPORATION

There began in Woburn, a hundred and sixteen years ago, an industry which has been carried on continuously and without interruption by members of the Fox family, and which, after nearly six decades of existence has evolved, in the same town, where, in 1814, old-fashioned leather was first produced in the best way then known, methods unique in the annals of the leather industry of America.

That year, Capt. William Fox, descendant of a long line of business and professional men of that name, leased a parcel of land, on what is now Cambridge Street, in Woburn, to his son-in-law, Gen. Abijah Thompson, upon which a tannery was erected, in which both were interested as partners.

The tanning pits were placed out of doors and were covered in winter with timbers and layers of spent tan bark to prevent them from freezing; the bark was ground in an iron pot mill (one of the very first used in this part of the country), which was driven by horse-power. The hides were handled in and out of the pits only once in several weeks, and six months or more were consumed before they were tanned enough to work. After shaving the whole hide to the desired thickness by hand over a beam—a long, tedious process—the leather was stuffed with tallow and oil and blacked with steeped sumac leaves and iron filings treated with vinegar.

After a few years General Thompson retired and Captain Fox operated the tannery until about 1830, when his son, Warren, began to manufacture on his own account in the original plant.

Later on, the business was conducted on Kilby Street, where the crudest types of machinery were used, with little union splitting machines and a home-made pebbling hack, the original pebbling roll of which is still preserved in the family as a cherished relic of bygone days.

In this factory the manufacture of Fox's boot-back splits was begun the fame of which spread to England and the Continent, as well as over this country.

In 1875 Warren Parker Fox became the active head of the business and conducted it for twenty years, admitting his son, Everett Parker, as a partner in 1885.

In 1895 Everett P. assumed the management, and in 1904 his brother, John W., was admitted to the firm of W. P. Fox & Sons.

From the small beginning, 116 years ago, in the little tannery on the west side of Woburn, where fifty hides per week was considered a large quantity to tan and finish, the business has grown to a capacity of 1,200 hides per day, in the present plant on Fowle Street.

Steam and electricity have supplanted horse-power. Chrome tanning has largely taken the place of bark tanning, and the chemist's art is called upon and made use of from the time the hide enters the beam house until the finished product leaves the factory.

The hides are now split in the lime and sulphide. The grains are made into smooth, dull, and bright finished leathers for both men's and women's medium and high priced shoes, or into soft, springy, full leathers, in black and colors, for sporting goods.

The splits are either tanned out in chrome, or into full, plump, vegetable-tanned wax finish for the European trade.

For many years W. P. Fox & Sons were the exclusive tanners for Locke, Tolman & Co., of Boston, in which firm Everett P. Fox became a partner.

In 1921 Tolman-Dow & Co., Inc., acquired the business of W. P. Fox & Sons, Inc., which in turn was taken over by the Tolman-Fox Corporation, in 1925.

The corporation maintains sales offices in St. Louis, Cincinnati, Rochester, New York City, Milwaukee, Philadelphia, Paris, and Melbourne, and has its main offices and headquarters at 201 South Street, Boston. Upwards of 250 operatives are employed at the Woburn plant.

Gilbert Tolman, Jr., is president, John W. Fox, vice president, Rodney Tolman, secretary, and Everett P. Fox, treasurer, of the corporation.

THE E. CUMMINGS LEATHER COMPANY

The E. Cummings Leather Company dates back to 1856, when Eustace Cummings became a member of the leather concern of Shaw, Taylor & Co. in Woburn. The concern was incorporated about twenty-five years ago and now occupies 20,000 or more square feet of manufacturing space, employing upwards of 125 operatives in tanning leather.

The corporation has capital of $75,000, and Edward H. Cummings is president and treasurer, and L. A. Cummings, secretary, the board of directors consisting of the above, and Edward S. and Eustace H. Cummings.

TWO LOCAL INVENTORS

In 1863, Stephen M. Allen recorded a patent for the manufacture of paper from wood, the timber, cut into suitable lengths being crushed longitudinally, to preserve the integrity of the fibres, and after being steeped and washed alternately in warm water at different temperatures, was boiled, ground, and bleached. Another method, patented the same year, by P. A. Chadbourne, of Williamstown, produced paper stock from wood by means of reciprocating rasps, files, or scrapers, kept in contact with a rotating log by the agency of springs.

TWO LOCAL CONCERNS ESTABLISHED IN THE EIGHTIES

Beggs & Cobb, Inc., was established in Winchester, in 1881, by William Beggs and Elisha W. Cobb, and the concern now employs 700 operatives in its tanneries in Woburn and Winchester, and maintains a Boston office at 76 South Street.

Daniel D. Beggs is president, Sydney A. Beggs, vice president, Donald H. Smith, secretary, and Charles O. Howe, assistant treasurer.

The Bay State Mop Company was established in 1889, and incorporated in 1925, with capital of $20,000.

A. W. Munroe is president, and R. C. Brehaut, secretary and treasurer.

THE WOBURN MACHINE COMPANY

The Woburn Machine Company was established in 1899 for the manufacture of hide and leather working machinery, and in the intervening thirty years has become a recognized authority on everything mechanical pertaining to this important industry.

This company was the first to introduce the roll type setting machine, in which the rubber bed roll and the felt covered feed roll were used in combination. It also introduced the internal gear drive for drums, which immediately superseded nearly all other types of driving mechanism for drums, and introduced the pneumatic bed for whitening machines, a great

improvement over the solid rubber bed. The silent "V" belt drive for blacking and seasoning machines, which eliminated the disagreeable noise of the gears, and the driven ring rolls for leather splitting machines, which has been the most important improvement on the band knife splitting machine since it was first invented, are two other devices placed on the market by this company.

The corporation has capital of $100,000 and employs seventy-five operatives. Thomas H. Marrinan is president and treasurer.

THE ATLANTIC GELATINE COMPANY

One of the twelve United States manufacturers of edible gelatine is the Atlantic Gelatine Company.

Impressions to the effect that hoofs, horns and hair constitute the raw material of gelatine manufacture, and that the process itself is unsavory, are not only ridiculous, but are entirely unfounded by the very nature of things. Keratin, the chief constituent of the horny animal substance, cannot be made to yield commercial gelatine, and it differs markedly from collagen, which constitutes the greater part of the skin, connective and bony tissues commonly employed in making edible gelatine. The Atlantic Gelatine Company uses calf trimmings, although several other plants prefer bone tissue, for reasons that are purely economic.

From start to finish, the making of gelatine is replete with applied chemistry and chemical engineering, a technical staff of three chemists, a bacteriologist and several assistants being constantly at work at the Woburn plant on problems of technical development, production control, and industrial applications, every precaution being taken to insure purity of product.

The company is capitalized for $1,000,000, and employs approximately 100 hands.

Peter J. Widen is president, Solomon J. Barnet, vice president, Joseph H. Cohen, treasurer, and Walter Creese, secretary.

THE THAYER-FOSS COMPANY

The Thayer-Foss Company was formed in 1905, with capital of $200,000, since increased to $1,000,000, and it now operates two extensive tanneries, in Woburn and Peabody, where upwards of 600 hands are employed and where more than 3,500 sides a day are turned out.

The late Harry I. Thayer originated, in 1901, chrome-tanned side leather in the line, and was the first tanner in the world to market the product. Prior to that time, no attempt to produce chrome patent side leather had been successful, and Mr. Thayer's process was epoch-making in results.

By his method, cowhide leather, once considered suitable for only the roughest types of shoes, was transferred into a leather of great beauty and softness. Mr. Thayer was the first member of his family to become a tanner and yet he accomplished what men whose ancestors for many generations had been engaged in leather manufacture regarded as a futile experiment.

He was assisted by Frank Wayland of Salem, in working out the mechanical problems. The latter invented a special device, consisting of a patent corrugated roller, which was attached to the splitting machine then in use, and which adapted it for splitting in the line.

To these two sons of Massachusetts the leather industry is indebted for one of the most important developments in its history, and it should not be forgotten that it was conceived in this century.

The corporation has capital of $1,000,000 and employs 600 hands. Lloyd J. Thayer is president and treasurer and F. J. Haley, secretary.

THE MASSACHUSETTS GEAR & TOOL COMPANY

In the spring of 1922 the Massachusetts Gear & Tool Company was incorporated, with capital of $50,000, and purchased the real estate, machinery and good will of the Woburn Gear Works, which had been operated as a partnership by the Warren Brothers, both of whom had died the year previous.

Operations were begun in a small way by the new concern which specialized on the production of high-quality gears of all descriptions in the smaller and medium sizes. The business developed so rapidly that three times since the formation of the concern additions have been made and equipment increased until the manufacturing area now employed is more than double the original plant capacity.

The corporation operates a large screw machine department in which it produces its own gear blanks, while its gear cutting equipment is of the most modern type.

Since 1922 the company has never operated on short time, nor has it laid off an employee because of lack of business, and it now operates with 100 skilled mechanics.

E. R. Lyman is president and treasurer, Harrison F. Lyman, secretary, and Joseph Cavicchi, superintendent.

OTHER ENTERPRISES IN WOBURN

In 1928, the Widen-Lilly Tanning Company was established, and manufactures cowhide leather, turning out about 4,000 sides each working day.

The Bailey & Blendinger Manufacturing Company, with capital of $20,000, employs thirty-five operatives in the manufacture of machine knives of every description, including planing, moulding, cooperage, chipper, rag cutting, paper trimming, veneer, leather cutting, stop cutter, high speed steel, excelsior, and special, as well as metal cutting shear blades. D. E. Bailey is president, W. C. Bailey, treasurer, and E. N. Leighton, secretary.

The Bay State Japanning Company, Inc., of which I. O. Cornelinson is president, William Widen, clerk, and Charles E. Erickson, treasurer, employs thirty operatives in carrying on japanning operations.

The Bushway Ice Cream Company of Somerville operates one of its three Massachusetts plants in Woburn, while the Cambridge Paper Box Company maintains a branch factory in the city.

The Crescent Tanning Company, with capital of $300,000, employs 300 operatives in tanning leather, B. J. Kaplan being president, and S. Feuerstein, treasurer, the Boston office of the concern being located at 107 South Street.

The Louis Foucar Leather Company, Inc., capitalized for $50,000, employs seventy-five hands in the manufacture of patent leather. A. H. Foucar is president and treasurer of the corporation.

The John J. Grothe Company, of which Francis J. McDonald is president, A. B. MacKay, vice president and A. A. Jaquith treasurer, produces refrigerator bodies and ice cream cabinets, and employs fifty operatives.

Kean-Bedell, Inc., employs 100 hands in the manufacture of patent leather, the concern having capital of $50,000. Carl R. Bedell is president, H. H. Horton, secretary, and Frederick C. Kean, treasurer.

One of the two Massachusetts plants of the Merrimac Chemical Company is located in Woburn.

The Murray Leather Company, a partnership made up of Francis S. and James S. Murray, manufactures patent leather and Murbuck, and maintains a Boston office at 171 South Street.

The Peterson Patent Leather Company, Inc., of which Alfred W. Peterson is president and treasurer, employs seventy-five operatives in the production of leather.

The Peterson Merrill Company, Inc., capitalized for $25,000, carries on japanning and employs fifty hands, Edward H. Merrill being president, Herman P. Peterson, treasurer, and Edward Johnson, clerk.

A. W. Peterson & Company, Inc., employs fifty operatives in the manufacture of leather. W. S. Thorpe is treasurer of the corporation.

The Prime Tanning Company, with capital of $150,000, employs seventy-five hands in the production of patent leathers and flexibles, Morris Kaplan being president and treasurer.

The Quality Manufacturing Company, Inc., manufactures mops and dusters and employs twenty-five operatives. Fred Hill is president, A. M. Kinnic, secretary, and Ernest C. Alward, treasurer.

The John J. Riley Company employs 175 hands in the manufacture of leather, and has its Boston office at 36 Lincoln Street. John J. Riley is president, and Thomas F. Riley, treasurer.

The Tribble Cordage Mills, Inc., employs 100 operatives in the production of cordage, having its main headquarters at 38 Chauncy Street, Boston. A. L. Tribble is president, E. C. Tribble, secretary, and J. J. Bumstead, treasurer.

The Woburn Degreasing Company, with capital of $200,000, specializes in recovering leather grease. A. G. H. Reimold is president and treasurer and C. Philip O'Rourke, vice president and assistant treasurer.

The Woburn Iron Foundry Company employs thirty operatives in its Woburn Highlands plant, in producing grey iron castings, and also operates a branch in Plymouth. Roger S. Kellan is president, and John Russell, secretary and treasurer.

The Barrett Leather Company, of Little Falls, N. Y., recently acquired the Woburn plant formerly owned and operated by the American Hide & Leather Company, and is now operating the tannery and japanning units.

D. E. Bailey is president, W. C. Bailey, treasurer, and E. N. Leighton, secretary.

The B. & G. Brassiere Company employs 135 hands, in manufacturing brassieres and corselets, Samuel Ginsberg being president and treasurer of the corporation.

The Connors Japanning Company employs thirty operatives in japanning leather, the concern being owned by John Connors.

The New England Degreasing Company employs thirty operatives in the degreasing of leather. A. H. Johnson is president, and W. E. Johnson, treasurer, of the concern.

The Paramount Petticoat Company, capitalized at $50,000, employs 100 operatives in the manufacture of petticoats, bloomers, slips, and chemises. B. Bunshaft is president and treasurer.

The Peterson Degreasing Company employs ten operatives in the degreasing of leather. A. W. Peterson is treasurer, and Osborn Hozanson, president of the concern.

The Ray Japanning Company, owned by Joseph Ray, employs ten operatives in the japanning of leather.

CHAPTER XLIII

MARLBORO

WHERE SHOES HAVE BEEN MANUFACTURED UNDER THE FACTORY SYSTEM FOR NEARLY A CENTURY

Nearly a century ago the manufacture of shoes was commenced in Marlboro under the factory system. Joseph Boyd began the manufacture of boots and shoes in 1835 in an addition to his father's house, and the firm of L. and I. Bigelow was established the next year. In 1838, John W. Stevens erected a shoe factory and he was followed by William Dadmun in 1840, both Dadmun and Stevens producing shoes by machinery.

Samuel Chipman & Brother, and Charles D. Bigelow began shoe manufacturing there in 1842. The same year John H. Boyd invented the shoe die which had much to do with the advantage Marlboro shoe manufacturers gained over many shoe-producing towns in the early stages of manufacturing. He continued the production of shoes until 1857, his business amounting to $500,000 in these years—a figure that was considered large at that period.

Freeman Morse entered the manufacturing field in 1846, and ten years later formed the firm of Freeman Morse & Bro., which operated for a full half century thereafter.

In 1849, Chase, Merritt & Company erected their factory, and in 1851 Charles G. Whitney started business, this concern later becoming Whitney, Felton & Chipman. In 1867 this firm sold its factory to Rice & Hutchins, who erected, in 1878, what was really the first modern shoe plant in the city.

Charles M. Howe began business in 1853, Frank A. Howe in 1858, and Abel Howe and H. O. Russell, as partners, started the manufacture of shoes the same year.

Samuel Boyd, a brother of John H., the inventor, was the first local manufacturer of shoes to put into operation the team work system, which was really the beginning of the modern methods of producing footwear, and he was also the first manufacturer to possess courage sufficient to warrant the erection of a large factory. By 1871, his plant had one and one-half acres of manufacturing space—a total supposed to represent at that period the largest shoe plant under one roof in the United States.

Soon after his graduation from high school, S. Herbert Howe formed a partnership with his brother, Lewis A., and began the manufacture of shoes in his father's cooper shop. Later purchasing his brother's interest he remained sole proprietor until 1861, when he removed to a larger shop and entered partnership with Allen D. Howe, this firm being dissolved in 1865. Mr. Howe incorporated the S. H. Howe Shoe Company in 1888, and became its president. Two large shoe factories were at once erected, and two others were purchased, the famous four, known as Diamond "A," "F," "O" and "M," having a daily capacity of 10,000 pairs of shoes. In 1890 Mr. Howe became the first mayor of the city and later served as a member of the Governor's Council.

THE JOHN A. FRYE SHOE COMPANY

In 1876, the late John A. Frye was one of the first, if not actually the first, shoe manufacturer to change from the commission form of selling goods to the plan of placing his products in the hands of a jobber. His son, Walter P. Frye, made a specialty of manufacturing the type of footwear known as heavy working shoes, which continues to be the product of the company.

The John A. Frye Shoe Company is the oldest shoe concern in Marlboro, and today has capital of $750,000, and employs 500 operatives.

Walter P. Frye is president and treasurer, John A. Frye, vice president, and Robert P. Frye, secretary, of the corporation.

SOME INTERESTING STATISTICS

In 1837, the shoe plants of Marlboro produced 103,000 pairs of shoes, valued at $41,200, and employed 150 men and women. There were two small tanneries employing seven hands, and two manufacturers of chairs and cabinets, employing four persons. Some 7,500 straw bonnets were made there that year, valued at $10,850.

By 1845, the value of the 624 pairs of boots and 302,725 pairs of shoes locally produced had risen to $92,932, and 278 men and women were employed in the industry. Ten years later, 103,500 pairs of boots and 1,971,500 pairs of shoes were manufactured by 1,942 men and women workers, and the product was valued at $1,156,975.

In 1860 the sales value of the boots and shoes made there was in excess of $2,000,000, these figures representing the production before the town of Hudson was set off from Marlboro.

In 1878 the shoe products of the town were valued at $3,000,000, some 3,500,000 pairs of boots and shoes being produced that year.

In 1927 the value of all products manufactured in Marlboro amounted to $10,533,698, and while the statistics gathered by the Massachusetts Department of Industries do not segregate the amount of production credited to a single industry, boots and shoes stood first as the principal product of the thirty-five manufacturing establishments in the city, paper boxes being second, stamped ware, third, and wire goods, fourth. It is not an overstatement to assert that at least 75 per cent of the total represented the value of the boots and shoes locally produced that year.

The stock and materials used in 1927 by the thirty-five industries were valued at $6,022,159, and 2,888 wage earners were employed, to whom were paid $3,000,764 in wages.

THE MARLBORO WIRE GOODS CO.

Prior to the World War, H. E. Moineau was operating a modest wire goods business, but during the struggle he diverted his operations to the manufacture of ammunition for both the United States and French governments. Following the Armistice, he returned to the production of wire goods, entering the field during the period of post-war deflation, and at a time when conditions were anything but satisfactory.

In February, 1921, he organized the Marlboro Wire Goods Company, which was incorporated, the following April, with these officers: president and general manager, H. E. Moineau; vice president, A. J. Fontaine; treasurer, E. T. Simoneau; production manager, A. A. Fontaine.

Starting operations in a small room, only the corporation's officers were employed during the first six months, but soon a profitable market

was established for the company's original designs in the line of wire goods, its loop weld products, which it patented, being so successful that within five years it was able to erect its own building, where 50,000 square feet of manufacturing space are utilized, while more than 125 men and women are carried on the payroll. It is capitalized for $100,000, and the outlook for future growth is extremely favorable.

In July, 1929, work was begun on a three-story brick extension, 60 by 60 feet, which added nearly 11,000 square feet of manufacturing area to the plant.

SUCCESSFULLY MEETING A CRISIS

The advantage of having a live Chamber of Commerce in a city or town was widely shown in Marlboro during 1928. When the old established corporation, known as Rice & Hutchins, Inc., decided that year to liquidate and retire from the shoe manufacturing field, the city was confronted with a crisis, as four large shoe factories were at once thrown upon the market.

The Chamber immediately formed the Marlboro Industrial Trust and the so-called Curtis factory—one of the largest shoe plants in New England—was purchased by it for $50,000.

Two manufacturing firms—the Rebot Shoe Company and the Madison Shoe Company were induced to come to the city and the plant was remodeled to suit the needs of these concerns.

The Rebot unit leased the entire upper floor of the factory and has steadily added to its production capacity.

Many other accessions followed in the wake of this movement. The Felsiner Shoe Company of Haverhill leased for five years the Abel Howe factory, while the Acme Wood Heel Company, a subsidiary of the Felsiner concern, occupied, in 1928, the basement of the same plant. The parent organization manufactures McKay shoes, and employs 300 operatives.

The Curtis Shoe Company purchased the same year the Middlesex factory, formerly owned and occupied by Rice & Hutchins, Inc., and began operations with 300 hands, and is now producing upwards of 1,500 pairs of shoes daily, while the box factory, formerly a unit of the latter concern, was acquired by the Duane Factory Trust, which was organized by the Marlboro Chamber of Commerce. The Duane Shoe Company removed to Marlboro from Haverhill, and began the manufacture of women's McKay shoes, employing 200 operatives, and adding $130,000 a year to the shoe payrolls of the city.

The same year the Broadway Shoe Company occupied the shoe factory where the Howland Shoe Company formerly operated, and employs 300 hands.

The Frye-Corbin Box Company, manufacturers of shoe boxes and general set-up boxes, the same year moved into the former cut sole factory previously used by B. A. Corbin & Son Company, which consisted of a two-story brick building, containing 12,000 square feet of space, and a storehouse, 150 by 50 feet in size.

On June 20, 1928, the Maylon Shoe Company of Boston began operations in Marlboro, producing women's welt shoes, and employing 125 workers.

By August of 1928 the weekly payrolls, according to reliable figures, had been stepped up to $71,000, a rate which if maintained for a year would place some $3,692,000 in the envelopes of the local workers, or a total in excess of what the Marlboro factories of Rice & Hutchins, Inc., paid when operating under normal conditions.

THE HOWE LUMBER COMPANY

The Howe Lumber Company has its main headquarters in Marlboro, and until 1929 operated a box shop in Greenville, N. H., as well as numerous portable sawmills. For more than half a century the concern was a large producer of wooden boxes for the shipment of shoes, but the advent of the reenforced paper carton narrowed the demand for the old-fashioned wooden shoe case, and Marlboro shoe manufacturers who had used the company's products for many decades began turning to cheaper containers, with the result that the Howe concern decided to abandon the manufacture of wooden boxes and devote all its energies to the lumber trade.

The Howe Lumber Company was formed by the late Hon. George A. Howe, who was Marlboro's second mayor, and by Arthur B. Clifford and Austin B. Howe. For many years past the business has been owned and managed by Charles F. Connors, Arthur F. Blanchard and George A. Moore.

The Koehler Manufacturing Company is one of the local concerns that has aided in helping to diversify the local industries. It has capital of $50,000 and employs 110 operatives in the manufacture of metal stampings. Henry G. Powning is president and W. S. Field, secretary and treasurer.

The Marlboro Last Company, with capital of $50,000, employs twenty hands in the manufacture of shoe lasts, E. S. Morse being president and Harold S. Morse, treasurer.

B. A. Corbin & Son Company operates one of its two Massachusetts plants in Marlboro and produces men's and boys' shoes, 1,500 operatives being employed in the local and Webster factories.

Henry G. Powning is president, W. S. Field, secretary, and Henry G. Lapham, treasurer.

The Franklin Shoe Company, a subsidiary of the Corbin concern, operates a plant in Marlboro, as well as in Webster.

The Dennison Manufacturing Company, of Framingham, established a Marlboro branch about five years ago, after making a careful survey of the facilities of towns in the vicinity of its home plant, and has since erected the most modern buildings occupied by any local manufacturing concern, all being of concrete and steel construction. Several hundred workers are employed at the Marlboro branch.

The Marlboro Shoe Company, Inc., of which A. Hershenson is president, and H. I. Lyons, treasurer, manufactures women's shoes, employing 400 hands, and having capital of $150,000.

The advent into Marlboro's industrial picture of such concerns as the Dennison Manufacturing Company, the Marlboro Wire Goods Company, and the Koehler Manufacturing Company, gives the city that diversification of manufactures it has so long needed. From the beginning of its industrial life it has depended largely upon shoe production and with the fluctuations in the trade it has enjoyed periods of phenomenal prosperity and years of adversity, making it difficult to preserve a normal balance.

Its available factories are now well filled and the outlook is perhaps more favorable than it has been for several years past, but the efforts of the local Chamber of Commerce will no doubt be directed toward still greater diversification in order to be prepared for any let-down in the shoe-producing field.

CHAPTER XLIV

THE TOWNS OF MIDDLESEX COUNTY WHOSE MANUFACTURED PRODUCTS BELT THE WORLD

In upwards of a score and a half towns of Middlesex County, the vast majority of the inhabitants are dependent upon the continued prosperity of the industrial establishments operating within their respective borders.

From the payrolls of these enterprises flows the financial lifeblood of the communities, and coupled with the manufacturing interests of the eleven cities of Middlesex, the industrial importance of this geographical division of the Commonwealth is readily apparent to all who are conversant with the facts. The most populous county in the state, with the exception of Suffolk, and housing more than 800,000 souls, Middlesex County has within its limits upwards of twenty per cent of the total number of inhabitants in the Commonwealth. Her rate of growth in the ten year period between the census of 1915 and 1925 was more marked than that of any other county in the state, and was due in no small part to the great advances made by her manufacturing enterprises, which attracted labor to a greater degree than was observed in any other section of the Commonwealth. Furthermore, the population is made up of a highly desirable type of citizenship as is evidenced by the fact that in 1926 Middlesex County had 300,134 registered voters, as against 262,298 in Suffolk County, with a population 15,872 larger in 1925 than that of Middlesex.

THE MANUFACTURES OF ACTON

For almost a century the manufacture of powder has been the leading industry in Acton. It was in 1835 that Nathan Pratt established his powder enterprise there, which he operated until 1864, when he sold the plant to the American Company. In 1883, it was succeeded by the American Powder Mills, which now employs 125 operatives at the South Acton plant.

The company specializes in gun powder and blasting supplies, and maintains its Boston office, at 131 State Street. M. J. Connolly is president, H. A. Wentworth, vice president, J. H. Wilson, treasurer, and John M. Merriam, secretary.

In 1870, Asaph Merriam, father of the two chief executives of the A. Merriam Company, of South Acton, and an accomplished artificer in woodworking, founded the concern in a small building, in Meriden, Conn., and a few years later removed to the present location, adjacent to the irons of the Boston & Maine Railroad Company, in South Acton.

In 1887, the two sons, Frank A. and William T. entered the firm, and upon the death of the father, in 1924, they assumed managerial control. In 1925 the third generation, in the persons of Harold A. and Herbert W. Merriam, entered the business.

When the company was organized stools were the popular seats for pianos. Many of these products were very pretentious in design, upholstered with velvets, silks, etc., and attractively decorated with hang-

ing fringe. On through the evolution of the piano stool to the highly polished or mission finished stool of the present day moved the concern. When the bench was introduced to the trade the A. Merriam Company was among the first to produce these commodities, and the same applied to the advent of the piano chair.

The present partnership includes H. A., F. A., W. T., and H. W. Merriam, and thirty-five hands are employed at the South Acton plant.

In 1898, Fred and William Rawitzer established the South Acton Woolen Company for the manufacture of reworked wool in all the various grades, staples and colors, the product being used in spinning mills in the same manner as virgin wool in the production of woolen yarns. The concern has an annual output of approximately 3,500,000 pounds of stock, and it employs seventy-five men and women, the annual payroll being about $120,000. William Rawitzer is president and treasurer, and Howard A. Wilson, is secretary of the corporation, which was incorporated in 1915, with capital of $200,000.

In 1913, Frank B. Lothrop organized the Frank B. Lothrop Company, and engaged in the manufacture of metal stampings, including steel and wire brush ferrules, and brass, zinc and tin bands. Extensive plant additions have been made in the intervening years, and much new equipment installed. From fifteen workers in the earlier days, the payroll has increased until today more than fifty are employed at the South Acton plant. Of an inventive turn of mind, Mr. Lothrop has evolved within recent years the Lothrop special timer for Ford cars, and also a fan belt guide for the same make of automobile.

The corporation has capital of $20,000. Mary H. Lothrop is president, and John V. Green, treasurer.

Hall Brothers Company, a Massachusetts trust, owned by Edgar H., Bertram D. and Edgar H. Hall, Jr., employ forty operatives in their plant, at West Acton, in the manufacture of various kinds of wooden ware.

THE THEODORE SCHWAMB COMPANY OF ARLINGTON

In 1862, Theodore Schwamb founded the Theodore Schwamb Company, and began the manufacture of grand piano cases on the second floor of the building, now numbered 1093 Massachusetts Avenue, in Arlington. Soon afterwards Mr. Schwamb purchased the structure, and occupied all the floors. In 1871 he removed to 1171 Massachusetts Avenue, where water power was available. Ten years later a steam plant was installed, and in 1886 extensive additions were made to the mill, the plant employing twenty men at that period. In 1897 the company was incorporated, and four years later additions were made to the plant, which practically doubled the floor space. In 1905 land was purchased in the rear of the buildings, affording access to rail service through a spur track; and a four-story brick factory, 60 by 80, was erected, together with a large lumber storehouse.

The next year, dryhouses, a new boiler plant and an extension to the brick factory were added, and later the dryhouses and lumber sheds were enlarged and a lumber conditioning house built. In 1920 a new engine house was constructed for an electric generating plant, which now drives all the machinery electrically and supplies current for lighting. Later, an additional boiler was installed.

The manufacturing floor space, exclusive of dryhouses, lumber storage and boiler and engine plant, has increased from 13,220 square feet in 1897, to 52,800 square feet at the present time.

The company's equipment is modern and especially designed for the manufacture of its specialty,—grand piano cases. When operating at capacity the plant employs from 100 to 125 men.

The officers are John D. Eberhardt, president; Philip Eberhardt, treasurer, and N. D. Eberhardt, clerk.

The corporation has capital of $90,000.

The Arlington Cement Block Company, a subsidiary of the Arlington Construction Company produces concrete building blocks, and employs thirty-five men.

At Arlington Heights are located the Arlington Machine Works, owned by Arthur Birch, engaged in the production of bleach and dye works machinery.

H. B. Johnson is president, Sidney H. Hunking, vice president, F. R. Johnson, secretary, and H. W. Howe, treasurer, of the Fuel Reclamation Company capitalized for $90,000, and engaged in producing fuel reclaiming machinery.

The Huff Electrostatic Separator Company with capital of $50,000 manufactures mining machinery, Herbert B. Johnson being president, and Russell Burrage, treasurer, of the corporation. Mr. Burrage is also treasurer of the International Carbon Products Company which produces graphite at its Arlington factory, the Boston office being located at 85 Ames Building.

Clinton W. Schwamb & Company, Inc., employs twenty-five operatives in the manufacture of raw mouldings and oval frames, Louis H. Schwamb being president, and Clinton W. Schwamb, treasurer.

The Solvent Products Company of which Charles R. La Rose is president, and Ralph R. La Rose, treasurer, is engaged in the manufacture of textile oils and soaps.

The Vail Brothers-Mauger Corporation, with capital of $30,000, employs forty hands in the production of builders' finish, F. R. Vail being president, George M. Vail, vice president and secretary and Ray E. Mauger, treasurer.

Albert M. Wilder is the only manufacturer in the town of Ashby, employing twenty-five men in producing wood turnings.

ASHLAND'S EARLIER AND LATER INDUSTRIES

On January 23, 1811, Samuel Valentine, Jr., Aaron Eames, Elias Grout, Fisher Metcalf, and others, bought of Samuel Clark, the fulling mill property, at the Falls, on Hopkinton River, where Ashland Center is now located, and began cotton manufacture there simultaneous with a movement that was inaugurated to establish a like enterprise at Saxonville, in the town of Framingham.

Seldom indeed do critics differentiate between natural causes and those over which an industrial leader has no control when, in a town that hitherto has flourished as a manufacturing center, there is observed the withering, ultimate decay or removal of existing units.

Immediately the assumption is made that something is wrong with the management, or that the proponents of the local enterprise are unwilling to admit that they committed a *faux pas* in setting up their business in that particular locality, when, as a matter of fact, such reasons frequently are completely beside the truth.

Such an illustration is found in Ashland.

In 1846, the Middlesex Union Factory Company acquired a four-story mill building, that had been erected some thirty years before, and imme-

diately engaged in cotton manufacture, and Ashland began to boom in a healthy way. But eight years later, the structure burned and with the destruction of the plant it appeared that the water power on the Sudbury River would continue to go to waste.

Came 1868, with the Civil war in retrospect, and with capital waiting to accept chances. A group of textile men visited Ashland, looked over the idle terrain, analyzed the water supply, formed the Dwight Printing Company, bought the idle property, erected a substanial building of granite, and began an extensive business in bleaching, dyeing and printing cotton cloth.

Within two years after its formation the success of the concern had been such as to warrant starting work on seven large additional structures of granite, into which were poured half a million dollars before construction was halted.

Ashland took on new life. Her citizens, encouraged by the confidence in the future of the concern as manifested by this unusual expenditure in their midst, embarked on a residential and business building program designed to meet the demands that would surely flow from this large corporate investment in granite and mortar.

Over night Dame Rumor reported that the city of Boston was to acquire the Sudbury River as a part of its water supply, and hearsay soon gave way to fact.

Work on the mill buildings ceased and the local real estate boom then under full headway collapsed. Legal action was brought against the city by the Dwight officials, but the inexorable hand of the law swooped down on Ashland with all the fury of a cataclysm, the courts holding that no industrial corporation possessed the inherent right "to befoul the waters, or render them unfit for drinking purposes," and the Dwight Printing Company succumbed.

With its demise went the hopes of the citizens of Ashland who had dreamed of an inland Fall River.

It was on this same Sudbury River that Calvin Shepherd & Son had begun the manufacture of newsprint paper by hand, subsequently producing it by water power, and then by steam. Burned in 1842, the plant had been rebuilt on a larger scale, but had closed its doors eight years later. In 1855 Charles Alden assumed ownership of the idle paper plant and began the pulverizing of minerals. Just prior to the Civil War, he secured a monopoly on emery manufacture, and acquired a fortune while the four years' struggle between the North and the South continued. Intense competition following peace reduced profits and when the rights to the realty and water-power were taken by eminent domain for the Hub's water system this business, too, came to an end.

In 1880, the Warren Thread Company leased one of the idle Dwight Mills and began the manufacture of spooled threads, but this accession did not assuage the grief of the denizens of Ashland of that generation who never became wholly reconciled to the loss of the Sudbury water powers.

For many years the town was a boot and shoe center, Calvin Dyer, Daniel Morey, Simpson Jones, William Wheelock, William Seaver, Hiram Temple, Albert Leland, the Messrs. Tilton, and others, being prominent shoe manufacturers of the forties and fifties.

In 1882 Newhall & Company bought the Wheelock shoe shop, and later transferred the business to Woodville.

Charles Tilton built one of the largest shoe factories of his era, which was acquired by Houghton, Coolidge & Company, in 1885, when that concern was operating many plants on a broad scale.

In the nineteenth century, Ashland was the center of many shoe manufacturing enterprises, some of them occupying large factories, but its twentieth century activities have been transferred to the fields of clocks and timing devices, water wheel governors, dyes and intermediates, stationary and marine engines of the Diesel type, webbing, extracts and baking powders, and paper tags for hats.

THE LOMBARD GOVERNOR COMPANY

Back in the last century, water wheels which were so prevalent in factories located on the almost countless large and small streams of Massachusetts could only be started and stopped by the employment of manual labor, while speed and power were ineffectively controlled by means of a friction clutch type of mechanical governor. Even after the advent of electricity many years elapsed before any satisfactory and practical means was devised for speed control from a switchboard or a remote point, and the close governing essential for the parallel operation of alternating current generators, or for interconnecting hydro-electric generator stations was generally considered to be impracticable.

It was not until 1894 that Nathaniel Lombard, after several years of intensive experimental work, developed the hydraulic type of governor, and then and there was born a Massachusetts industry which in the succeeding years has become prominently identified with many of the large power plants of New England and this country.

The part played by the Lombard Governor Company, which first began to produce the Lombard governors, in a modest little plant in the Roxbury district, of Boston, and which removed to a larger factory, in Ashland, just before the close of the last century, has helped to establish the world-wide reputation of Massachusetts-built machinery.

The phenomenal hydro-electric development of this section of the United States was materially aided and advanced by the advent of the Lombard invention, and not many years elapsed before a large number were in use in power plants from Maine to California, as well as in Canada, and in many other foreign countries.

The great advance in the art of governing that followed in the wake of the early Lombard models has been steadily carried forward, until the latest types are as nearly human as a robot or the televox. The recently completed hydro-electric power station owned by George A. Plimpton, at Walpole, which is started, phased-in, operated, and stopped from a distance, without the aid of a local human attendant, is typical of the modern Lombard governors, turned out at the Ashland plant.

In 1922, another forward step was taken by the Lombard Governor Company when its manufacturing plant and facilities were extended for the construction of marine and stationary Diesel type oil-burning engines, and since that year many of these, in sizes varying from sixty-five to 660-horse-power have been turned out there.

The company has capital of $450,000 and employs 200 operatives, most of whom are skilled mechanics.

Ashley F. Wilson is president, D. E. Bancroft, secretary and treasurer, and J. H. Mueller, sales manager of the corporation.

AN OUTSTANDING TWENTIETH CENTURY INVENTION—THE WARREN TELECHRON CLOCK

The faculty of being inquisitive, which has distinguished the sons of Massachusetts, from the earliest settlements is still dominant, and that trait of character which is represented by the art of "digging" into things and to determine the whys and wherefores, is largely responsible for one of the most novel contributions of the twentieth century—the famous Telechron springless electric clock—the invention of Harry E. Warren, of Ashland, who, like so many other geniuses is a product of the Massachusetts Institute of Technology.

Had he ceased taking an interest in problems once he had solved them, no doubt he would have joined the millions who lack initiative to enter original and untried fields of endeavor, but far from being an imitator, he began, as a boy, to make things with his own hands, which would add to human comfort. Out of this progressive spirit came his initial triumph —the building of a large windmill atop a hen-house to drive a small dynamo. Long before gas engines came into general use, he created one that operated his mother's sewing machine, and following that success he fabricated another of larger size, which operated an old turning lathe.

Scarcely out of M. I. T., he discovered a method of measuring temperatures at a distance, which he called the "Thermophone," and upon which he obtained a patent. Installations of these devices were made at the State House, in Boston, and at the National Capitol, in Washington.

From 1900 onward, Mr. Warren spent most of his spare hours in studying clock mechanisms, at his home, in Ashland, and summoning to his aid a capable mechanic, he fitted up an old hen-house on his farm, with second-hand machinery, and a small gasoline engine, where he built several models of electrically-driven clocks, but more time was spent in designing machinery to build parts for clocks, especially gears.

Finding that the process of making the latter advanced more rapidly than that of manufacturing clocks, and as it possessed immediate commercial possibilities, and appeared to provide a stepping stone to the clock business, this feature was expanded. The equipment was extended, installed in a large, red barn on the Ashland farm, and the Warren Gear Company was organized, and eventually six or eight men were employed, and the plant was operated night and day. During all this time, Mr. Warren did not forget his idea of developing an electric clock, and he spent all the time possible in experimental work. Finally, the day arrived when it was believed that the gear business could be subordinated in favor of electric clocks, and the factory was removed to one of the idle stone structures, owned by the Lombard Governor Company, in Ashland, where the work of developing the new time-pieces was carried along with the building of other commodities, intended for the U. S. Government. The clocks built at that time, while attractive, and marketable, were delicate in mechanism, and unsuited for general use because they were rather inflexible in design, and could not be employed in system installations where they were demanded.

Mr. Warren decided there was but one feasible way to provide time service involving a radical departure from all kinds of similar devices then on the market, and that was the utilization of the alternating electric current generally used for light and power. To secure this, necessitated the coöperation of public utility corporations in the electric field, and the first requirement was a small motor which could count the alternations as

they came in over the wires—a device technically known as a synchronous motor.

Finding that no such mechanism was in existence, Mr. Warren confronted the most stupendous task to which he had addressed himself. Entertaining some ideas of how such a device might be designed and built he began a series of experiments, and spent days, weeks and months, only to record negative results. He tried hundreds of different combinations of parts, but they all proved defective in that they either would not operate synchronously, or that they would not start automatically. He realized that the principle of their self-starting was the key to the situation, and by far the most important requirement, inasmuch as the flickering of an arc lamp served to show instantly whether or not the sample motors were synchronous.

Finally, one day in July, 1916, he was told over the telephone that one of the designs he had suggested had proved to be both self-starting and synchronous. This first motor was connected by gears to the hands of a clock, which he had built for another purpose and which had been connected to the Edison system. Time records were made at frequent intervals for many days, and it became evident that the instrument was not keeping accurate time, but so certain was Mr. Warren that the motor itself was synchronous that he called the engineering department of the Edison Electric Illuminating Company, of Boston, and expressed the opinion that the trouble must be in their frequency, which observation met with the response that they were using the best obtainable frequency meters and that they were frequently checked. However, they were sufficiently impressed and rechecked their instruments, and assured Mr. Warren that they operated correctly, whereupon Mr. Warren countered with the statement that their standard must be wrong. Shortly afterward, he was asked to send samples of his motor-driven clocks into the Edison laboratory for tests and informed the executives that while he was quite confident their frequency was wrong, yet he believed it would be feasible, through the medium of an instrument he would build, to make it accurate so that the motor-driven clocks would correctly record the time of day. When the laboratory executives completed their work of experimentation with the clocks provided by Mr. Warren, they became converted to his opinion.

The inventor then began building what he denominated as a master clock, for use in the power station, creating it along the lines of the present-day type of "A Master Clock," although the product was somewhat crude and considerably more complicated because of the then-existing belief that it was necessary to indicate time errors in several different ways. The original master clock was built in such a way as to coöperate with the type of frequency meter then in general use. Late in 1916, this first master clock was installed in the office of the superintendent of the L street power station of the Edison Company for observation, and upon October 23rd, the day it was placed in operation it functioned exactly as planned, and the station attendants adjusted their speed control motors to conform to the indications of the master device. The results were satisfactory from that moment, and regulated frequency became available in the Boston Edison system, and never since has there been any interruption, save in one or two accidents of a few minutes duration. From that date, the Ashland enterprise grew, and clocks driven by the new self-starting synchronous motors were built as rapidly as possible, and were

sold for installation on the Boston Edison system, designed for public buildings and stores.

Finally, a combination Greek word, "Telechron" was devised to cover the new method of time-keeping, the name meaning "Time from a Distance."

The Warren Gear Company was succeeded by the Warren Clock Company and manufacturing was carried on by a dozen employees on the second floor of the Lombard Building, under disadvantageous circumstances, as an active foundry was located below, while the floor of the clock company was of such loose construction that gases rose into the area given over to production.

The fame of the new company spread and ere long the new method of regulating frequency led to the installation of master clocks in New York City, and other centers. Soon the concern was unable to keep up with orders and on October 27, 1927, a new factory building, erected about half a mile distant from the former location, was occupied. It was built in accordance with the latest designs developed by the General Electric Company, but almost before the company moved in an addition was provided. The factory, 180 by 75 feet, was provided with a clearance overhead of sixteen feet, and an overall height of 28 feet, and contained 14,300 square feet of area.

The latest developments in factory construction were embodied in this building. From the outside, one notices particularly the predominance of glass—for there are 2,500 window panes—as well as the simplicity and grace of design. Within, one is impressed by the remarkable brightness and freedom from shadows.

The frame is of steel with unusually large trusses supporting the sawtooth roof. These trusses have such a wide span that there are only four main posts within the entire floor area. The walls are of red brick on the exterior and of white brick on the interior, except on the southerly side where a temporary wall of protected steel was provided, in order to permit expansion of the building to four times its original area. The floor is of reinforced concrete supported above the ground level so as to provide a basement under the building. The space under the floor contains most of the wires and pipes which are required for various purposes. In addition to the 2,500 window panes which permit the maximum of daylight for all operations, a series of well located powerful lamps provide the nearest substitute to daylight during the early darkness of the winter months.

The boiler is housed in a separate building 25 feet to the rear of the factory.

The layout of the available floor space was so planned as to permit the maximum of efficiency in the various operations. The procedure from raw material to finished product follows a line through the plant, such as is described by an inverted letter "U"—entering the door at the rear, passing along through various operations up one side of the building, across at the further end to the other side and down this side to the rear of the building again to another door from which it is sent on its way to its destination or to the completed-stock room.

In the front of the building are located the factory offices which are partitioned from the factory proper and from one another, each being provided with abundant light and heat. Modern sanitary lavatories with hot and cold running water, a first aid room, sprinkler system, gas and air under pressure, enameled steel stock racks, drafting room, spray and

dipping rooms, blue-print room and test racks for Telechrons are some of the special features.

The official opening and house-warming were scarcely over before it was seen that plans for further extension must be made, and in 1928 an addition was erected, which increased the total floor area available for production and storage from 14,300 to 42,000 square feet.

The enterprise has now reached the point where it may be considered one of the most important in the clock industry, and, of course, the largest in the electrical clock industry. Aside from the thousands of Telechrons now in use in homes, stores, and office buildings, the company has installed hundreds of self-contained clock systems throughout the country and the world.

Among the installations are those in the Presidential Palace in Cuba; the City Hall Annex in Philadelphia, perhaps the largest, consisting of three hundred and seventy-two Telechrons; and the State Capitol in Seattle, Washington. The company has also installed a considerable number of tower clocks with exposed hands, the largest and most outstanding, consisting of four dials, twenty-six feet in diameter, with Neon illuminated hands and numerals, in the tower of the Williamsburg Savings Bank Building, in Brooklyn, N. Y. The Boston & Maine Railroad station is equipped with Telechrons, including the fight-timing Telechron devices in the arena of the Boston Garden.

Because of the increased production, Telechrons are now available in a great variety of popular models at popular prices, and in addition to the line manufactured by the Warren Telechron Company, the Revere Clock Company of Cincinnati, Ohio, has been licensed by the Warren Company to manufacture a large line of strike and chime electric clocks, Telechron motor operated. These strike and chime clocks are available in beautiful mantel and hall designs, one of these being presented to President Hoover, by employees of the Department of Commerce, when he left that bureau.

The master clock which gives accuracy to all Telechron clocks in Boston and vicinity is located at the L street generating station of the Edison Electric Illuminating Company of Boston. This clock, at all times in synchronism with the government time clocks at Arlington, Virginia, in turn transmits its control over the wires of the Edison system to all Telechron electric clocks in the vicinity of the Hub.

The corporation employs 250 operatives, at the Ashland plant, and it has representatives and agencies throughout the United States, Canada and foreign countries, practically all of its business being carried on through wholesale distribution. It has capital of $250,000. H. E. Warren is president, Ellen M. Eames, treasurer, I. W. Kokins, general manager, and Florence S. Sturgeon, secretary.

Henry E. Warren takes his place as the inventor of two devices that were unknown a little more than a quarter of a century ago—the "Thermophone," which measures temperatures at a distance, and the "Telechron," which records time from afar—additional proof if it is necessary to convince the pessimist that inventive genius is not dead in the Bay State.

Here again one finds convincing and irrefutable evidence that this Commonwealth is as prolific in providing the world with modern inventions conceived by its ingenious citizens of the twentieth century as it was in adding to the productivity of the nation in the preceding century through the medium of labor-saving machines, processes and devices evolved by the inventors of that era.

While electricity remained locked up in ignorance for centuries until Benjamin Franklin let it out with his pass key, it has ever since confounded the scientist and the layman by refusing to stand still long enough to permit them to understand its manoeuvres. While the world was aware that it had been from its inception one sixtieth of a second faster on its feet than its nearest competitor,—tea table gossip; that it had been described as science gone crazy with the heat, and that with it a person might start a conversation or stop one permanently, cook the dinner, comb the hair, press a pair of trousers, blow up a battleship, start an automobile, or signal Mars—it remained for the Ashland inventor to harness it to observatory time.

OTHER ASHLAND ENTERPRISES

The New England Aniline Works, Inc., manufactures dyestuffs and intermediates, from coal tar, at its Ashland plant, maintaining a Boston office, at 93 Broad Street. The concern has capital of $500,000. Carl P. Waldinger is treasurer, and John R. O'Day, vice president.

The Waban Webbing Company, owned by H. R. Chadbourne, is engaged in the manufacture of webbing straps, and employs twenty-five operatives. H. R. Chadbourne is president, and G. F. Chadbourne, treasurer.

Moshier Brothers, owned by William D. Moshier, employs twenty hands in the production of extracts and baking powder, and the firm of Ray Brothers, of which Lucy F. Ray is proprietor, and J. A. Carlson, manager, manufactures paper tags for hats.

The C. A. Cook Company, which was established in Cambridge, in 1887, removed to Ashland in 1928, and manufactures office and Windsor chairs.

The corporation has capital of $30,000, and employs fifty operatives. Charles A. Cook is president, G. Raymond Tuttle, vice president, and Clyde G. Lewis, treasurer.

THE INDUSTRIES OF AYER

The power of the Nashua River was first utilized in Ayer by Joshua Longley, who set up a small mill, in Mitchellville, in 1790. The town's first large industry was a plow concern, established by Benjamin Martin, which later passed to H. O. Bean, who operated it until 1855, when it was sold to Nourse, Mason & Company. In 1864 the Oliver Ames Plow Company acquired the plant, and in 1874-75 removed the business to Worcester. The buildings were occupied by the Beaver Glue Company until they were destroyed by fire December 2, 1886.

In 1854, Stephen Dow, of Worcester, established a tannery, in Ayer, which later was operated by Dow & Frye, in the manufacture of various types of leather.

In 1902, Eugene Barry who developed a new calf leather called Velours calf established, with his sons, Eugene S. and Theodore W. as partners, the firm of Eugene Barry & Sons, which has grown until today it employs 150 operatives, and is the town's largest industry. Eugene Barry is president, Eugene S. Barry, vice president and general manager, and Theodore W. Barry, treasurer.

The Chandler Machine Company, owned by Frank Maxant, employs fifty men in the manufacture of pleating machinery and equipment, L. K. Yoder being manager of the plant.

The Feculose Company of America, with capital of $122,350, employs

twenty-five operatives in the production of sizings and adhesives, and maintains its Boston office, at 88 Broad Street. A. N. Hood is president, John T. Nightingale, secretary, and Gerald N. Thaxter, treasurer.

The Hamel Metal Screen Company, of which Joseph P. Hamel is president and treasurer and Stephen P. Hamel, general manager, manufactures self-adjusting metal window screens.

Robert Murphy's Sons Company, of which W. E. Murphy, is president and treasurer, is engaged in the production of high-grade cutlery. The concern is capitalized for $18,000, and was established in 1850, and incorporated in 1913. It is the oldest industry in Ayer.

BEDFORD

As early as 1805 Jonathan Bacon and John Homer began the manufacture of children's shoes for the Boston market, practically every department of their industry being supplied with tools of their own invention and manufacture. They increased their production until the annual sales reached $90,000. Bedford was famous for its hand-boxes in the first half of the last century, and in 1812, the locality began to mine and prepare "Bedford Yellow" paint—yellow ochre.

Brick making, tanning and currying followed, and in 1840 a paper mill was established and flourished until the plant was burned and never rebuilt.

Today, there are three active industries in the town—the Arabian Manufacturing Company, of America, of which I. Pfeiffer, is the owner, manufacturing pile wire knives for carpet looms and wrought iron novelties; the Loomis Manufacturing Company, producing wadding or packaging material, with a Boston office at 266 Devonshire Street, and the Farrington Radio Service, owned by C. W. Farrington, and engaged in the production of radios.

THE INDUSTRIES OF BELMONT

Campbell & Wiswell, Inc., manufactures paints and varnishes at its Belmont factory. The corporation has capital of $50,000 and R. N. Campbell is president, Ernest H. Johnson, secretary, and Paul T. Wiswell, treasurer.

The Elson Art Publication Company, Inc., of which A. W. Elson is president and treasurer, and J. A. Ray, clerk, has capital of $50,000, and employs thirty hands in the manufacture of picture frames. Associated with this concern is A. W. Elson & Co., owned by A. W. Elson, employing twenty-five in producing photogravure plates and prints.

The Housing Company with capital of $730,000, and employing 100 men, has its factory in the Waverley section of Belmont, and its office at 40 Central Street, Boston. It is engaged in architectural millwork and in the building of ice cream delivery bodies and cabinet work. Albert Farwell Bemis is president, W. P. Fuller, vice president, H. R. Brigham, secretary, and Robert Bowser, treasurer.

The Cambridge Botanical Supply Company, of which E. S. Russell is treasurer, manufactures scientific apparatus, in the Waverley section of the town.

TEXTILE MANUFACTURE BEGAN IN BILLERICA, IN 1811

In 1811, Francis Faulkner began the manufacture of woolen goods, in North Billerica, the plant he built being the second of its type in New England. For over a century, the concern conducted a successful busi-

ness, the property being acquired by the North Billerica Company in 1914, which carries on the manufacture of woolen blankets and white and colored flannels. The plant is equipped with eight sets of cards, fifty broad looms, one garnet, three pickers, 3,640 woolen spindles, complete dyeing, bleaching and finishing departments, two boilers and one water wheel. It employs 135 operatives, and has capital of $150,000. F. C. Farnsworth is president, W. C. Morrill, secretary and D. W. Farnsworth, treasurer.

The Faulkner Mills, at North Billerica, are operated as a subsidiary of the North Billerica Company and are engaged in the manufacture of woolen fabrics.

About 1830, Jonathan Hill began the manufacture of machinery, in the town, the principal device produced being a leather splitting machine invented by Samuel Parker.

THE TALBOT MILLS

In 1839, Charles P. Talbot leased a building, at North Billerica, owned by the Middlesex Canal Company, of Lowell, and began grinding dyewoods, being joined the following year by his brother, Thomas, when the firm of C. P. Talbot & Company was formed.

In 1851, it acquired, from Nathaniel Stevens, the dam, water power, sawmill, and twenty acres of land, upon which the present woolen plant of the Talbot Mills was erected. In 1849, the manufacture of chemicals was added to the company's production. The plant was burned in 1853, and the Messrs. Talbot sold the site to Francis Faulkner, and purchased more extensive rights of the Canal Company on the opposite side of the stream, where they built a dyewood plant.

In 1857, Charles P. and Thomas Talbot engaged in the manufacture of woolen goods, which has been carried on continuously for seventy-three years. Joining with the Belvidere Company, of Lowell, the Talbot brothers built and equipped a mill with eight sets of cards and fifty looms, and, in 1862, the firm of C. P. Talbot & Company became the sole owner. Six additional sets of cards were installed in 1880.

Thomas Talbot remained active in the management and was successively elected a member of the General Court of Massachusetts and of the Governor's Council. In 1872, he was chosen Lieutenant Governor and served from January, 1873, to May 1, 1874, when he became acting Governor until the following January, following the election of Governor William B. Washburn, who was chosen United States Senator, on April 17, of that year, to succeed Charles Sumner.

In 1878 he was elected Governor and served from 1879 to 1880 as the Chief Executive of the Commonwealth.

In 1884 the company with which he was so prominently identified was reorganized as the Talbot Mills, the plant having been enlarged in 1870 to a capacity of fourteen sets of cards, and ten years later to twenty sets, all housed in substantial brick buildings.

In 1883, Frederic S. Clark became identified with the Talbot Mills, being elected treasurer the following year, and general manager, in 1885. Under his able management a large concrete and steel mill was erected in 1922, and the equipment now consists of twenty sets of cards, 228 broad looms, 13,423 spindles, complete dyeing and finishing departments, two boilers and two water-wheels. The company owns 150 houses in which many of the operatives reside, operates park and garden systems, and carries group life insurance and pensions on all its employees. A library

containing over 5,000 books is also maintained for the benefit of the operatives.

Mr. Clark's son, Thomas Talbot Clark, became identified with the corporation in 1910, and today fills the positions of president and treasurer.

Frederic S. Clark was president of the concern for more than a quarter of a century, up to the date of his death, February 18, 1929, and he served for several years as president of the National Association of Woolen Manufacturers.

The concern employs 450 operatives and is capitalized for $500,000.

The company's woolen goods hold high rank in the textile field, and in 1928 the corporation was awarded a contract by the United States Government to manufacture 145,000 yards of olive drab material for the enlisted men of the Army, which involved a payment of some $320,000, and which represented thirty per cent of the complete requirements. The same year the removal of the plant from Billerica was threatened by reason of what appeared to be unreasonable exactions on the part of the municipal authorities, but happily refunds were granted, and the corporation's officers announced that this important concern would remain in Billerica. In 1929 a new brick dye-house, of mill construction, 120 by 75 feet, one story high, was erected at the North Billerica plant.

The Cochrane Chemical Company traces its beginnings to the advent into North Billerica, in 1849, of Alexander Cochrane, who came to the United States from Scotland, where he had been engaged in chemical activities. Entering the firm of C. P. Talbot & Company, in North Billerica, he planned and built the chemical works of that concern, which, as early as 1839, had begun grinding dyewoods there.

The Cochrane Company manufactures dyestuffs and has capital of $50,000. William D. Cochrane is president, John Cochrane, secretary, and Forrest S. Collier, is treasurer.

The manufacture of glue was commenced, in Billerica, by Jaquith Brothers, in 1867.

The Barrington Manufacturing Corporation of which John A. Barrington is president, F. H. Barrington, vice president, and L. K. Daniels, secretary and treasurer, is engaged in the manufacture of washing and bleaching compounds, at its Billerica plant, where twenty operatives are employed.

THE INDUSTRIES OF CHELMSFORD

In 1656, William How became an inhabitant of Chelmsford, and received an allotment of twelve acres of meadow and twelve acres of upland "provided he set up his trade of weaving, and perform the town's work."

The first fulling mill erected in the vicinity of Chelmsford, for the dyeing of homespun cloth, probably began operations in 1691, for on February 2, of that year, Lieutenant John Barett, and his son, Jonathan, B., were given permission by the town to erect such an enterprise, on Mill Brook, and it appears that the factory was built in the neighboring town of Carlisle, near the road leading from that municipality to Chelmsford.

The so-called "Third Grist Mill," set up in Chelmsford, in 1695, by Daniel Waldo, was variously utilized in the intervening centuries, the Merrimack Manufacturing Company purchasing it and finally disposing of it in 1839, while the Ayer Drug Company ground spices and drugs by its power for many years, and worsted yarn was made at the site by several companies, followed from 1872 to 1882 by a shoddy concern, which

turned out 250,000 pounds of the commodity each year. In 1889, the dam was removed after having been employed for power purposes for nearly two hundred years.

Jonathan Richardson and Lieutenant John Barett were given liberty at a town meeting, held on March 4, 1706-7, to erect iron works, on Stony Brook, which property was located in the valley between North Chelmsford and Forge Village.

In 1790 Moses Hale set up a fulling mill at West Chelmsford, and eleven years later added a carding plant. It was in this village that the Ames Company began the manufacture of swords—the first concern in America to turn out these products, removing to Chicopee, in 1829, where it still carries on this type of production.

In 1813, a wooden factory was erected, in East Chelmsford, for the manufacture of cotton. Five years later it was sold to Thomas Hurd, of Charlestown, who equipped it with sixteen looms, turning out 120 yards of satinet per day, and also manufacturing flannels. Destroyed by fire, it was rebuilt, in 1826, and the assertion is made that Hurd was the first manufacturer in America to produce satinets by water power.

In 1823 the Farwell Scythe Works were established at West Chelmsford, the product giving the locality the name of the Scythe Factory Village. During the Civil War the manufacture of swords and other weapons was revived in that village, the plant suspending operations in 1865.

In 1825 a blast furnace was erected, in Chelmsford, by General Leach, and used native and vicinity bog ore harvested in Concord, Dunstable and Groton, while the limestone employed as flux was secured from local quarries. Many castings, including heavy gears, for Lowell and other nearby mills were produced, and upon the death of the founder, in 1832, the furnace was acquired by Lincoln Drake, of Easton, who added a cupola furnace and carried on operations, until 1849. He was succeeded by Williams, Bird & Company and in 1858 George T. Sheldon purchased the plant, and organized the Chelmsford Foundry Company, which continued the business until 1913, when the corporation was liquidated.

THE NORTH CHELMSFORD MACHINE & SUPPLY COMPANY

In 1832 the firm of Silver & Gay Company which later became Gay, Silver & Company, was established, the assets of the concern being purchased by George C. Moore, in 1890, who operated it as the North Chelmsford Machine Company until 1905, when it was incorporated with the North Chelmsford Supply Company, which had been organized in 1897, under the name of North Chelmsford Machine & Supply Company, with capital of $50,000. H. Stanley Crysler became president, George C. Moore, treasurer, and Henry Woods, secretary. On April 27, 1901, the plant was partially destroyed by fire, but was immediately rebuilt.

It was at this mill that the automatic ball winder, for winding twine, yarn, silk, etc., was originated, and perfected, and the concern was one of the first to manufacture worsted yarn machinery.

In South Chelmsford the first lucifer match ever made in the United States was fabricated by Ezekiel Byam, in 1835, who sold his products four for a cent. The business grew to such proportions that it was deemed desirable to remove it to Boston, which was the big market for the product.

In the olden days, bog iron was smelted and forged in Chelmsford, and local iron foundries and machine shops dated from this early industry, Asa Swain establishing a large machine business, in 1867.

THE GEORGE C. MOORE WOOL SCOURING MILLS

In 1872, George C. Moore bought an old foundry building, where a splendid water privilege existed, and began wool scouring and combing. Three years later, he erected a brick mill, 100 by 70 feet, three stories high, which was destroyed by fire, October 25, 1875. He then built a temporary wooden structure, 100 by 40 feeet, one story high, and in 1877, a brick mill, 220 by 70 feet, one story in height. In 1885 he added a two-story brick building, 140 by 76 feet, and three years later erected machine and carpenter shops. In 1890, another brick building, three stories high, 100 by 70 feet, was added, which was partially destroyed by fire, on January, 19, 1909, but was immediately rebuilt.

Altogether, the plant contained twenty-five acres of floor space.

In 1905 he incorporated the George C. Moore Wool Scouring Mills, with capital of $125,000.

The concern has added rayon tops to its products, and now employs 200 operatives. Edgar Dixon is president, and W. I. Chase, treasurer and secretary.

In 1916 the Stony Brook Carbonizing Company was incorporated, at North Chelmsford, to engage in wool scouring and carbonizing, and has capital of $75,000. Forty hands are employed, and the officers of the corporation are identical with those of the George C. Moore unit.

CHELMSFORD GINGER ALE, INC.

While the manufacture of Chelmsford Ginger Ale was commenced at Sussex, New Brunswick, in 1895, where the enterprise was incorporated a few years later as the Sussex Mineral Springs, Ltd., which corporation continues, under this name, to dominate the market in the Maritime Provinces and eastern Quebec, it was not until 1901 that a plant was established in Chelmsford. This unit operated until 1907, under the same ownership as the Sussex Mineral Springs, Ltd., when C. George Armstrong, of Chelmsford, bought the business and continued it under individual ownership until 1925, when it was incorporated as The Chelmsford Company. Three years before, Mr. Armstrong had acquired the long-established plant of the Standard Company, of Boston, which included an extensive local bottling business and extract department whose commodities enjoyed national distribution. The Standard brands were discontinued, and the name Chelmsford was substituted. Today, the output of the Boston unit is practically equal to that of the Chelmsford plant, while the extracts made at the Boston factory are sold to bottling establishments throughout the country.

In 1926 the plant of the Granite Bottling Company, of Concord, N. H., was purchased, and the territory it served has been expanded. The next year, the business of the Worcester Products Company of Worcester, was acquired. From 1877 to 1927 the concern was engaged in the manufacture of Cold Blast Ginger Ale and the company controlled the largest trade in Worcester and vicinity. In 1927 the erection of a modern and model plant, located on the Boston and Worcester Turnpike, just over the Worcester line, in Shrewsbury was begun, and here the production of the Chelmsford product has been carried on under ideal conditions.

During the summer of 1928, negotiations were begun between The Chelmsford Company and the Canada Dry Ginger Ale, Inc., which resulted in the acquisition of the former business by the Canada Dry concern, which, that year, had an output exceeding $12,500,000.

The former corporation known as The Chelmsford Company was discontinued and Chelmsford Ginger Ale, Incorporated, was founded, with C. George Armstrong as president and treasurer; H. M. Cubberly, vice president; and J. C. Mills, secretary

The purchase price paid for the Chelmsford Company was $964,000, of which $506,250 was paid in cash, and the remainder represented 4,473 shares of the capital stock of Canada Dry, purchased in the open market.

The policy carried out successfully for many years by the former Chelmsford Company is being continued, and with the greater facilities of the Canada Dry organization, and its great buying power, the new corporation looks forward to enlarging its New England field of distribution.

The new corporation has capital of $600,000 and employs 100 persons. It operates factories at Chelmsford and Worcester, in this state, and in Concord, N. H.

THE WM. P. PROCTOR COMPANY

In 1905, William P. Proctor, who had built up a successful lumber producing business, and had operated several portable mills that had been engaged in sawing native northern pine lumber in Massachusetts, New Hampshire and Maine, incorporated the Wm. P. Proctor Company and began the erection at North Chelmsford that year, of a wooden box shook factory, with a capacity of about three carloads of wooden box shooks a week, which was finished and occupied the following year. The capacity was practically doubled during the next five years, and in addition to the company operated a lumber milling business and opened a retail lumber yard to provide an outlet for the higher grades developed in the company's lumber cutting operations.

Following a survey of conditions, the officers found possibilities in the kiln drying field, and in 1927 a plant was built for kiln drying in transit of lumber for the shoe heel trade, which has been steadily expanded until today it has a capacity for drying eight carloads of lumber at a time, as well as storage tracks, milling and storage facilities, the plant being one of the most modern in New England, and designed especially for the difficult drying of shoe heel stock.

The wooden box business is one of the few New England industries which uses native-grown raw materials, and every winter the Proctor concern saws a million and a half feet of lumber at its stationary mill, at North Chelmsford, all of which comes from wood lots cut off by small farmers within a radius of fifteen miles of that town, thus affording winter employment for the agriculturists and rendering the cultivation of small wood lots profitable for them. In addition, the concern saws about 3,000,000 feet of lumber at its portable mills, in New Hampshire.

The company's boxes and box shooks are marketed locally to the Lowell textile mills and throughout Connecticut, Rhode Island, New York, New Jersey and Pennsylvania. Enjoying milling-in-transit rates on the Boston & Maine Railroad the concern is placed on a favorable basis for even the distant markets.

The Wm. P. Proctor Company has been fortunate in having New England leadership and brains, its founder tracing his ancestry to a family which originally settled this section of the country and helped wrest it from the wily Redskin, while Norman P. Mason, who is now president of the corporation, possessed antecedents whose history goes back to the early settlements of New England. He is one of that large band of cour-

ageous leaders who is sure this section is working out its destiny with the same degree of fortitude and determination that characterized the early industrialists of Massachusetts. L. W. Goodhue is treasurer of the corporation, which has capital of $50,000 and employs 100 men.

THE SOUTHWELL WOOL COMBING COMPANY

James Southwell started at the bottom of the textile ladder, in the wool commission houses of Bradford, England, but close study and observation brought added responsibilities to him, and a desire to gain experience in American mills. Coming to this country, he was employed in the Arlington, Pacific, and Amoskeag plants, and in the Providence Combing Company, the Lorraine Manufacturing Company, and the Atlantic Mills, in Providence, R. I., where, for sixteen years, he was superintendent of the scouring, carding and combing departments.

In October, 1922, he determined to capitalize his experience, and incorporated the Southwell Wool Combing Company and erected a two and a half story brick mill, containing upwards of 100,000 square feet of well-lighted floor space, and provided shipping and receiving facilities, by connecting it with the Boston & Maine iron, via a spur track.

The equipment is the last word for the efficient sorting, scouring, carding, and combing of wool, many new devices, the result of Mr. Southwell's experience of more than thirty-five years in the wool trade, having been installed. The plant is provided with eight cards, to which are attached special burring devices of the company's construction.

The model plant, manned by a skilled organization of broad experience and high integrity, became successful from the date of the beginning of operations, late in the summer of 1923, and later it became necessary to install additional machinery, which resulted in a fifty per cent increase in production over the capacity of the initial units in the combing and wool scouring departments.

In 1928-29 additional machinery was placed in operation which increased the output by forty per cent more, thus doubling the capacity in an operating period of a little more than six years.

The corporation has capital of $200,000, and employs 100 operatives. Jacob Read is president, and James Southwell, vice president, treasurer and general manager.

OTHER CHELMSFORD ENTERPRISES

H. Stanley Crysler, of North Chelmsford, formed the Crysler Company, in April, 1924, to carry on a general mill supply business, and one of his principal patents, a rubber squeeze roll for wool washing machines and also cotton squeeze roll heads are built for him by the Stowe & Woodward Company, of Newton Upper Falls. For twenty years Mr. Crysler was the manager of the North Chelmsford Machine & Supply Company, successor to the Silver & Gay Company, which liquidated, in 1924, after a business life of ninety-two years.

In 1872, Gardner Fletcher began the quarrying of stone, in Chelmsford, and provided the columns that grace the portals of the Quincy Market, in Boston.

In 1880 Hon. Herbert E. Fletcher and Abram Brown formed the firm of Brown & Fletcher, a partnership dissolved the following year when Mr. Fletcher continued independently under the name of his father, Andrew Fletcher. Admitting his brother, Henry A., to partnership, the

firm continued as H. E. Fletcher & Company until 1908, when Henry A. retired, and Herbert E. incorporated the H. E. Fletcher Company.

In 1915, the unit that had been devoted exclusively to construction work was liquidated, and the H. E. Fletcher Company continued in the granite business alone, Mr. Fletcher's sons, H. H. and Ralph A. becoming president and treasurer, respectively, and the senior Mr. Fletcher serving as vice president. Capitalized for $600,000, the corporation employs 600 operatives in its quarrying operations.

The Molders Foundry Company, Inc., with capital of $50,000, employs thirty-five men in the production of grey iron castings, at its North Chelmsford plant. John H. Davis is president, Martin Grimset, secretary, and Bernard T. McArdle, treasurer.

THE KALIX CUP COMPANY

On July 28, 1924, the Kalix Cup Company was incorporated, with William E. Benson as president and Theodore M. Prudden as treasurer, for the manufacture of paper soda, coffee and drinking cups. Production was begun in a factory at Wilmington, removal being made to South Boston in 1926, when the concern introduced a five-cent ice cream cup, which resulted in such a flood of orders as to make it imperative to concentrate upon that product. In May, 1928, the controlling interest in the concern was acquired by Doran S. Lyons and the manufacturing operations were removed to West Chelmsford, Donald F. Cameron succeeding Mr. Prudden as treasurer at that time. The company has added ten-cent ice cream cups, eight-ounce hot drink cups and quarter and half pint waxed containers, and in 1930 will place on the market pint and quart containers. In order to arrange for more even distribution the concern has developed an encouraging South American and Australian business which takes care of the production when the seasonal decline of orders during the winter month is experienced in the United States.

The sales of the concern are rapidly developing and it seems destined to become one of the leading factors in the paper container industry of the United States. The company employs seventy-five operatives and the present officers are: President, Wm. E. Benson; vice president, Irving H. Fowle; treasurer and secretary, Doran S. Lyons. The corporation has capital of $250,000 and employs seventy-five operatives.

At North Chelmsford is the plant of the Silesia Mills, a subsidiary of the U. S. Worsted Company. When operating at capacity, 1,200 hands are employed in producing worsted yarns and fabrics. The Boston office of the concern is at 211 Congress Street.

THE MANUFACTURES OF HISTORIC CONCORD

When one recalls that Concord was the habitat of Ralph Waldo Emerson, Nathaniel Hawthorne, the Alcotts and Margaret Fuller, there seems to be little occasion to regard the town as an industrial community, yet as early as March 5, 1658, Oliver Purchis, of Lynn, and a group of Concord men, incorporated a company "to erect one or more iron works," in Concord, a considerable deposit of iron ore having been discovered in the southerly part of the town. Operations began two years later, following the building of a dam on the Assabet River, and were continued at least until 1694. Later in that decade work ceased and saw, grist and fulling mills were located at this privilege, one of the latter being operated as early as 1708.

In 1808 Ephraim Hartwell and John Brown formed a partnership for

the purpose of establishing a cotton factory, which must have been a sizable enterprise in view of the fact that in 1813, Ephraim H. Bellows, a nephew of Hartwell, paid $6,000 to acquire a third interest in the concern, the style of which was changed to Hartwell, Brown & Company.

Later Thomas Lord & Company of Boston purchased the plant, and in 1833 that concern sold the property to James Derby, a manufacturer of cotton and woolen machinery. At that time the wooden factory was 100 by 30 feet, and three stories high, and presumably no additions had been made to the plant since its erection in 1808. In 1834 it became the property of the Damon Manufacturing Company.

The manufacture of lead pipe was begun in the town in 1819, and the production of sheet lead was started in 1831.

In 1908, the Moore & Cram Webbing Company was incorporated, with capital of $10,000, and manufactures non-elastic webbings, tapes and narrow fabrics, L. H. Cram being president, R. B. Moore, treasurer, and C. F. Moore, secretary. Forty hands are employed at the Concord Junction plant, which is equipped with twenty-five narrow looms.

THE CONANT MACHINE COMPANY

In 1916, Wallace B. Conant began the manufacture of coal and gravel-handling machinery, at Concord Junction, with one or two employees. Early in its career, another building was added to the original plant, and this was followed by the erection of a large storehouse. The success of the "crowding-swiveling" loader, a type of gravel and sand loader, invented by Mr. Conant, was instantaneous; several hundred of these machines are now owned by city and town highway departments, throughout New England. Within recent years, Mr. Conant evolved a coal loader, designed for retail plants, which is meeting with a large sale. The company also carries in stock at all times several hundred tons of structural steel, at its plant, for distribution throughout New England by truck and rail.

Mr. Conant has been prominent in the affairs of the town, having been chairman of the electric department for eight years, and he was one of organizers, and the first president of the Concord Board of Trade.

The Conant Machine Company, of which he is the sole owner, now employs fifteen operatives. Wallace B. Conant is president and treasurer, Mrs. Margaret M. Ventres, assistant treasurer. and Edward B. Caiger, clerk of the corporation, which has capital of $100,000.

OTHER CONCORD CONCERNS

The Concord Garnet Mills were incorporated in 1927, to carry on commercial garnetting. D. J. Hayes is president, M. M. Fitzpatrick, secretary, and A. J. Christian, treasurer of the corporation. Thirty-five hands are employed.

The Allen Chair Company, owned by Charles W. Allen, employs 100 men at its Concord Junction plant, in the manufacture of chairs, and maintains a Boston office at 54 Canal Street.

For a generation or more the Bluine Manufacturing Company has been engaged in the manufacture of the well-known washing fluid, marketed under the trade name of "Bluine," at its Concord Junction factory, and employs fifty operatives. Benjamin Derby is president, R. H. Hatch, secretary, and C. Hayden Whitney, treasurer, of the corporation, which has capital of $100,000. Recently it has begun the manufacture of marine paint.

For seventy-five years or more, Concord Junction has been celebrated for the manufacture of harnesses and that the automobile has not entirely displaced the horse is evidenced by the fact that thirty employees are carried on the payroll of the Boston Harness Company, which operates a large plant today. G. W. Willis is president, C. R. Wheeler, secretary, and Berkeley Wheeler, treasurer, of the corporation, which has capital of $49,500.

DRACUT

A mill set up in Dracut, just prior to the beginning of the nineteenth century, dyed and dressed home-woven cloth, the owner, one Hale, carding by machinery, and in 1801 he introduced the first picker and power carding machine set up in Middlesex County. He also adapted or invented other labor-saving devices, ranking as a pioneer in a number of branches of woolen production, setting the knives he used in shearing the fabric at an angle, and weaving them horizontally by means of a crank. Hale also employed twisted blade shears, while his gig for napping cloth was a cylinder set with teasels.

Herrick Aiken, of Dracut, was given a patent on December 16, 1833, on sockets for awls and other tools, his pegging haft being deemed one of the most useful among the minor inventions connected with shoe manufacture.

In 1876, Michael Collins leased a mill on Beaver Brook, in Dracut, and began the manufacture of woolens. He next leased, and subsequently bought the Lawson Mill, and in 1886 erected a large brick factory, engaging extensively in the manufacture of overcoatings.

M. T. Stevens & Sons Company, of Andover, operate, in Dracut, the plant of the Merrimack Woolen Mills, which is equipped with 9,000 spindles, 106 broad looms and sixteen sets of cards. Dress goods and men's wear constitute the products of the local unit.

The Beaver Brook Mills of the American Woolen Company are located in Dracut.

FRAMINGHAM—A FAST GROWING INDUSTRIAL CENTER

The original settlers of Framingham were quick to harness the Sudbury and Hopkinton rivers, and Cochituate Brook, to industrial purposes, a cotton factory being set up on the Hopkinton stream, in 1811, by Samuel Valentine, while the same year, Hopestill Leland, of Sherborn, purchased the Deacon Brown privilege on Cochituate Brook, in Saxonville, of Ebenezer Brown, and erected a cotton mill, which, on February 6, 1813, was bought by the Framingham Manufacturing Company, which had been incorporated with power to hold real estate to the value of $30,000 and personal estate to the value of $50,000, for the purpose of manufacturing cotton and wool. The following year Leland sold six acres of land, with corn and grist mills, to this company, and thirty-two acres to Calvin Sanger, who headed the list of incorporators, and who bought the realty in behalf of the enterprise. Comfort Walker, another incorporator, located in Saxonville immediately after the corporation was formed and the concern started operations with energy, and soon fathered a considerable number of families, having children old enough to work in a mill, opened a company store, in charge of Samuel Murdock, employed a blacksmith, Joseph Pritchard, and, according to a local historian, "did a large, though not profitable business for a number of years." This plant was burned in 1834.

The Middlesex Manufacturing Company was formed, in 1812, to manufacture cotton goods.

In 1817, a paper mill was built in Framingham, and five years later, the Saxon Factory Company built a woolen mill, in Saxonville, which, by 1837, was operating five mills, and eleven sets of machinery, utilizing 750,000 pounds of wool annually, and weaving 250,000 pounds of cloth. In 1837, the company was acquired by the New England Worsted Company, and during the Civil War period kersey cloth for the Union Army was woven in large volume.

Michael H. Simpson, who was one of the founders of the Saxon Factory Company and the Roxbury Carpet Company was also the inventor of a machine for combing wool fibres, so as to separate those of long from the short staple, the success of which led him to purchase the Saxon Mills in 1839, where he engaged in the manufacture of bunting, the concern being the first to produce that type of fabric in America. The first American flag fabricated from American bunting was made on machinery adapted by him and was presented to the Washington National Monument Association on July 4, 1848.

The first record of wool combing machinery in America is found in the equipment of the New England Worsted Company of Saxonville, in 1845, consisting of sixteen sets of cards and twenty combing machines. There existed no worsted manufacture in this country until 1842, and as late as 1860 it was virtually confined to three mills, outside the carpet plants, which can scarcely be cited as being strictly worsted units, since carpet yarns and loosely twisted woolen yarns for knitting are merely carded. The process in preparing worsted yarn, for which long-stapled wools are chiefly used, is entirely different. By 1870 wool-combing machines in use in this country had increased to 261; by 1880 to 515; by 1890 to 839, and at the turn of the century to 1,451.

The plant of the New England Worsted Company was burned in 1883, but was at once rebuilt.

In 1829, William H. Knight established a carpet plant, on Cochituate Brook, which flourished until 1847, when the realty and water rights were acquired by the City of Boston for its water supply. All the water privileges enjoyed by manufacturers, on Cochituate Brook, passed to the city at that time.

From 1830 until after the Civil War straw hat manufacture constituted one of Framingham's leading industries.

In 1836 the Framingham Rubber Company began the production of rubber and rubber-coated goods and carried on manufacture for three years, this concern presaging the town's importance in this particular field in later years.

The Massachusetts Silk Company began the manufacture of silk products, in 1836.

THE ROXBURY CARPET COMPANY

In 1859 the Roxbury Carpet Company was incorporated, and this concern, now almost seventy-five years old, is still engaged in the manufacture of axminster, wilton, and velvet rugs and carpets, and employs 600 operatives at its Saxonville plant. J. F. Brown is president, W. S. Febiger is vice president, Henry B. Sprague is treasurer, secretary and general manager, and Howard Mason, agent. The corporation has capital of $1,997,400, and operates complete dyeing and finishing departments, in addition to the weaving of carpets and rugs, the plant being equipped

with nine sets of cards, 120 looms, 2,580 woolen spindles, two garnets, two pickers, ten boilers, and a water wheel.

In 1875, the Gossamer Rubber Clothing Company was formed, and in 1881 the Para Rubber Works were established to manufacture overshoes and boots and within a comparatively few years it became the town's largest industry. In 1882, the Gregory Boot Factory was formed and soon became second in size and importance to the Para unit.

Like many another industrial town, Framingham seemed destined to attain great growth in population and wealth as the result of its natural and acquired resources, but there were periods when circumstances appeared to conspire to tear down what her manufacturing enterpreneurs had built up.

The coming of the railroad, in 1846, was a constructive factor, but its effect was dimmed when, a year later, the acquirement of the water rights of the Knight carpet enterprise, on Cochituate Brook, condemned this concern to local oblivion. The town took hope in the '70s and '80s when rubber production was centered there, but these units had but a brief existence, and once again local industry seemed hard hit.

But events were shaping themselves to give to Framingham an industrial renaissance, and when the die was cast in the late '90s by the officers of the Dennison Manufacturing Company to remove from Roxbury it meant the advent into the town of an industry whose influence has been all-important for more than thirty years.

THE ROMANCE OF THE DENNISON MANUFACTURING COMPANY

Aaron L. Dennison, the inventor and founder of the interchangeable system of manufacturing watches in the United States, and the so-called "Father of American Watchmaking," was born on March 6, 1812, in Freeport, Maine, the eldest of a shoemaker's family of eight children. When, in 1830, his father apprenticed him to James Carey, a Brunswick, Maine, watchmaker, with whom he remained for three years, young Dennison gave full rein to his passionate love for all mechanical industries and began to turn over in his mind the possibilities of the manufacture of watches by machinery.

In 1833, at the age of nineteen, he came to Boston to perfect himself in the art of watch-making by hand and six years later he established his own business and at about that time he brought upon the market the Dennison Standard Gauge.

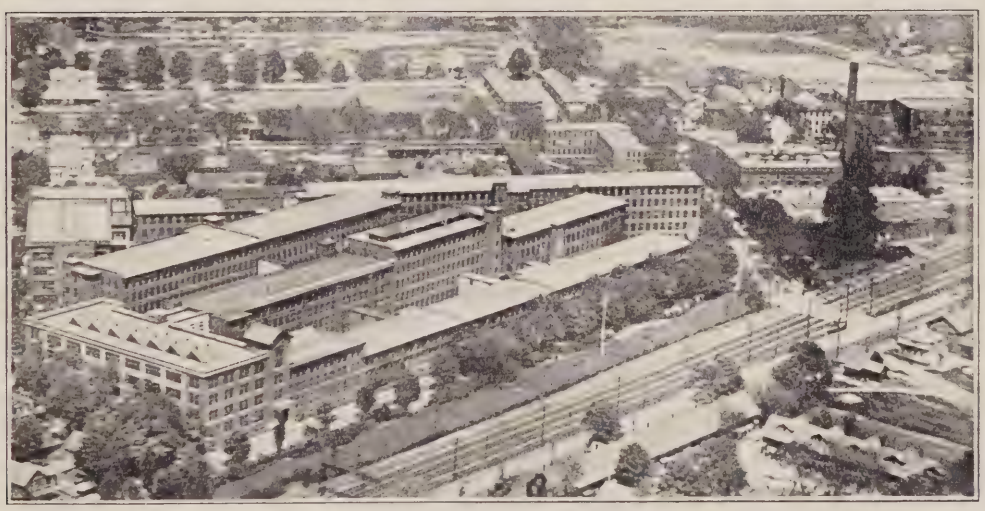
Importing a line of cards, small tags and jewelry boxes from France for his store and finding himself obliged to wait from three to six months for deliveries, it occurred to young Dennison that these supplies could be manufactured in the United States by simple machinery and at far less cost than the imported articles. His active brain soon evolved a machine for cutting the cardboard and paper to standard sizes, and he contrived simple devices to facilitate the printing.

Journeying to New York City, he bought a supply of boxboard and cover paper and with his roll of materials in hand he returned to Brunswick and arranged for the manufacture of the supplies by his father, Col. Andrew Dennison, feeling that this work would be less laborious than that in which he had been engaged for many years.

There Colonel Dennison, seated on his cobbler's bench, cut out the first boxes made in America, and they were put together and covered by the deft fingers of his daughter. The first workshop was in the upper room of the extension between the main house and the barn, and even



ELL OF THE OLD DENNISON HOMESTEAD WHERE WAS BORN THE DENNISON MANUFACTURING COMPANY, WHICH NOW EMPOYS FOUR THOUSAND OPERATIVES



AIRPLANE VIEW OF THE MAIN PLANT OF THE DENNISON MANUFACTURING COMPANY, FRAMINGHAM

today some Dennison boxes are being made in that little room by descendents of those who began to work there nearly eighty-five years ago.

For a few years, Aaron L. Dennison acted as Boston salesman, as well as one of the purchasers, of the boxes turned out by his father, brother, and sisters.

The first boxes were turned out by hand, but Colonel Dennison and his son, Aaron L., early realized that it was not a question of orders that would worry them, but rather production, and, together they worked out the first rough box machine, which is still the standard of its kind in all box factories. Over a score of these devices are in use today in the box division of the Dennison Manufacturing Company at Framingham, where also is preserved Colonel Dennison's old cobbler's bench—a monument to the industry and high ideals of the three original Dennisons—Col. Andrew, Aaron L. and Eliphalet W.

THE COMPANY BROADENS ITS FIELD

As early as 1856 a salesroom and a small factory had been established at 163 Washington Street, Boston, the successor to two previous locations, the first at 203 Washington Street, in 1850, and the second at 151 Washington Street.

By 1849 the father's interest in the business was turned over to his younger son, Eliphalet W. Dennison, who became the real founder of the Dennison Manufacturing Company. Six years later the latter purchased his father's interest in the enterprise, and until his death, at Marblehead, September 22, 1886, E. W. Dennison gave every ounce of enthusiasm in him and the best thoughts of an unusually active brain toward the development of the business which he always reverently, tenderly and unselfishly termed "Aaron's baby." His attitude toward the concern in times of adversity and business trials—and there were more of them than of prosperity in the earlier days of the business—is one which manufacturers of today might well emulate, for, as he gazed out into the future a healthy optimism always sustained him, and he never faltered when work stalked in front of him as the sole panacea for his troubles.

AARON'S BABY GROWS APACE

The sterling principles of business in habits which he laid down in the beginning of his career have continued to be the precepts upon which the present-day Dennison company operates. When the enterprise outgrew the old Dennison barn, it was established in a box shop on the second floor of the Poland Block, in New Brunswick, where about thirty hands were employed. The sister of Eliphalet W. Dennison established another Dennison box shop a little later in the Swift Block, in the same town. Finally, new quarters became necessary, and Mr. Dennison moved his manufacturing operations to the old Dunlap Block, on Brunswick's main street, and here the business was carried on until Christmas night, of 1879, when the building was totally destroyed. A new Dunlap Block was erected and Dennison boxes were made there until the box department was moved to Roxbury, Mass., in 1894.

In 1863, following the retirement of his father from the business of manufacturing cards and jewelry boxes, Eliphalet W. Dennison secured a patent for a device by which shipping tags were rendered more durable than those then in use throughout the United States. The invention consisted of reinforcing the hole in the tag with a paper washer on each side,

and his shipping tag of 1863 has stood the test of more than sixty years of usage, and is substantially the shipping tag of today.

In the first year of this improved manufacture 10,000,000 tags were sold by the concern, a total which seemed large in those days, but which in these times is dwarfed when one recalls that the Dennison concern markets more than five times that number in a single week. By 1876, the sales of tags reached 60,000,000, and three years later 90,000,000 tags were made and sold. With the assistance of Charles Sawyer, of the Perkins factory, at Roxbury, and Charles Moore, of Moore & Wyman, machine builders, the first tag machine was turned out, in 1863, by E. W. Dennison, and the idea upon which it was based was so fundamentally sound that the tag machines of this generation are based upon the same principle. There being no room to operate the tag machines at the Boston factory, they were set up in the Perkins factory, and finally, in 1878, this plant was purchased, and all jewelers' cards, merchandise and shipping tags were made there, and that year the business was incorporated. Factories were established at Boston, Roxbury, Brooklyn, and Framingham, in addition to the original plant, in Brunswick.

The first Boston location was shared with H. M. Richards, one of Attleboro's early jewelry manufacturers, and it was here that Albert Metcalf, a few years younger than E. W. Dennison, was employed. The acquaintance between the two young men ripened into a warm friendship and ultimately into partnership, which only death dissolved, Mr. Metcalf remaining active in the affairs of Dennison & Company, formed in 1855; in the Dennison Manufacturing Company, incorporated in 1878, and in the new Dennison Manufacturing Company—the industrial partnership—formed in 1911, up to his death, on January 2, 1912. To his command of detail and clear thinking, coupled with E. W. Dennison's mechanical and inventive genius and unbounded optimism, much of the early success of the enterprise was due.

In the great fire which swept Boston in November, 1872, the main plant of the Dennison enterprise occupying "seven floors about 34 by 70 all as full as an egg with goods, machinery, and 100 operatives," was destroyed with a loss of $45,000. Fortunately at the time, the manufacture of shipping tags was being carried on by Dennison & Company in the plant of E. L. Perkins, a cardboard manufacturer, in Roxbury, and thus decentralization had its compensations. But in 1874, a fire at the Perkins factory seriously interfered with the manufacture of shipping tags.

The Dennison store in Boston was moved, in 1875, to the corner of Milk and Hawley streets, thence, in 1884, to the present location, at 26 Franklin Street, where it has remained for forty-four years. In 1855 the New York store was opened, the present headquarters being at Fifth Avenue and Twenty-sixth Street, and seven years later the Philadelphia branch was opened. In 1868 the Chicago store was started. The next large addition to the Dennison line of manufactures came in 1865 when gummed labels were offered to stationers, E. W. Dennison purchasing W. D. Stratton's rights to the familiar red bordered label conceived by him.

In 1871 the company began the importation from an English paper mill of a tissue paper which would not tarnish jewelry or silverware, and as the same plant manufactured colored tissue paper, this line was taken on. In the late '80s the discovery was made that tissue paper when "crinkled" could be used for lambrequins, lamp shades, and the like, and

this led to experiments in making crinkled or crepe paper by machine, and while the first crepe product came from England about 1892, it was not long before the Dennison Manufacturing Company was making its own crepe paper—the first that was produced in this country, and in 1914 the beautiful type known as "Dennison Crepe" was introduced. The cumbrous machines of the '90s with their annual production of a few thousand folds have been discarded, and with the modern machines it is possible to turn out millions of ten-foot folds yearly.

In the early '90s the company established its now famous art departments.

THE REMOVAL TO FRAMINGHAM

In the late '90s the directors of the company felt centralization of operations was desirable and the plant of the Para Rubber Company in Framingham being on the market, it was purchased, and in 1897 and 1898 the box makers and tag makers at Roxbury, and later the wax and crepe paper departments in Brooklyn, were removed to the new unit which has since seen constant expansion until today over twenty acres of floor space are occupied, while a branch plant is operated at Marlboro, and a factory in London was recently established.

In 1884 the first move toward developing an export business was undertaken and today Dennison Manufacturing Co., Ltd., sells the products in Great Britain. In 1913 an office was opened in Buenos Aires to take care of the South American trade, and in 1917 another was established at Rio de Janeiro. Since then offices have been opened in Mexico City, Havana, Copenhagen, and Australia and the Philippines have been invaded. Each day Dennison workers produce upwards of 15,000,000 separate pieces of merchandise for the more than 100,000 customers whose names are carried on the company's books, and in round numbers 1,000 orders from as many concerns flow into the Framingham headquarters every day.

When Eliphalet W. Dennison died he was succeeded in the presidency by his son, Henry B. Dennison, who resigned in 1892, because of ill health, and he, in turn, by Henry K. Dyer, who started with the concern as its New York office boy. He retired in 1906 and was followed by J. F. Talbot, who resigned in 1909, when Charles S. Dennison, the younger son of the founder, was chosen as president, serving until his death in 1912. Frank E. Ewing, who, in 1878, was the office boy in the Cincinnati store was elected president in 1912 and served until 1917 when Henry S. Dennison, grandson of the founder, was elected head of the corporation, which position he occupies today.

Today the concern employs over 4,000 men and women, who receive in salaries and wages upwards of $6,000,000 annually, while the gross sales of the corporation are in excess of $16,000,000 per year.

RECOGNIZING THE WORKERS AS PARTNERS

In changing the business from a partnership into a corporation, E. W. Dennison did not aim merely to secure the business advantage of incorporation, but had in mind the sharing of the ownership of the business with those of his employees who contributed most to its welfare. Three years before the company was incorporated he wrote: "I am working quite hard to get our business into a form to pass to the good helpers we have as an inheritance. I am planning to incorporate it—our helpers will become stockholders, their stock to be paid for in the profits of the com-

pany." The corporation which Mr. Dennison created, however, was a normal business enterprise. It had only one class of common stock and the owners of it possessed the entire control of the business and shared its entire profits. The matter of distributing stock to the employees, moreover, was wholly a personal affair with the original stockholders.

During the period following the company's incorporation the risks of the business were high. By the end of the last century, however, it was so thoroughly established that there was no longer dangerous uncertainty as to profits. With the company on a sound footing, new money could be secured to finance its development at the ordinary rates of interest. Moreover, many of the old stockholders, all of whom had originally been actively engaged in the enterprise, had died. Their stock had passed to persons entirely unconnected with the company, who, though they knew nothing of its problems and needs, still had the power of selecting the directors and thus controlling the business. It was no longer necessary from the point of view of financing or of fairness to give investors unlimited profits, and it was also no longer desirable from the point of view of wise management to continue these investors in the entire control of policies. It seemed much wiser for the stock of the investor to carry a fixed dividend and give no power to control the company. At the same time it seemed equally desirable to carry out systematically the policy inaugurated by E. W. Dennison and give to those employees who knew most about the business, and who were most able to influence its profits, the profits earned above the fixed return to the investors, and control over the choice of directors.

To this end the company was entirely reorganized in 1911. All the common stock previously held by the investors was changed to non-voting first preferred stock, with a fixed annual return of eight per cent. The profits which remained after the payment of dividends have not been taken from the business annually, but since 1911 stock certificates have been issued to cover the surplus thus created. Until 1919 there was but one class of partners—(Managerial) Industrial Partners—and a corresponding kind of partnership stock called (Managerial) Industrial Partnership Stock. Today there are both *Managerial* and *Employee* Partners and Partnership Stock.

After the reorganization it became evident that the company could be still better managed if those employees who were not in managerial positions were also given a proper opportunity to strengthen its policies by their suggestions. In 1919, therefore, when the employees worked out a plan which was thorough and well balanced, the management immediately approved it. By the provision of this plan a General Works Committee was set up, composed of employees who were not Managerial Partners.

THE EMPLOYEE INDUSTRIAL PARTNERSHIP PLAN

Through the Works Committee the employees take an active and vital part in the conduct of the business. After they had assumed this direct share in management, they felt that they would contribute enough more to the success of the business to entitle them to a share in the profits then distributed only among the Managerial Industrial Partners. The management felt, in turn, that the stimulus to extra effort which comes from the more complete sharing of proprietorship by all employees might be both a benefit to the company and a means of increasing the earnings of the employees.

This last step in the development of the organization makes the con-

cern a true industrial partnership. The ultimate control of the policies of the company is in the hands of all managerial employees, while an important share of the internal management of the company is in the hands of the employees who are doing work of a managerial nature. Investors in the company do not share in the management, and are given a fixed dividend in place of a fluctuating share in the profits. Two-thirds of the profits remaining after the payment of fixed dividends are distributed, in proportion to their salaries, among the managerial employees, because they are the most influential in the creation of profits; and the other third is distributed, in proportion to length of service, among those of the remaining employees who have been long enough with the company to become thoroughly a part of it. Each person who has become a Dennison employee is thus a true partner in the business, sharing in the ownership of its capital and with a share in its profits and in its management proportionate to the influence which his position gives him in the earning of profits and the experience which his job gives him in solving the problems of management.

With its Works Committee, its unemployment fund, its men's and women's mutual relief association, its savings bank insurance, its own Dennison saving fund, a credit union, a clinic, a suggestion system, the Dennison Associates, the Girls' Club, a lunch room, library, house organ, and departments rendering tax advice, room registry, transportation facilities, legal advice, coöperative buying, garden plots, and vacation advice, every problem likely to arise in a group of human beings engaged in a common industrial enterprise, is covered.

These avenues of service reveal significant figures with respect to labor turnover at the Framingham plant. In 1911 labor turnover was 68 per cent. By 1920 it had dropped to 48 per cent; today it is less than 25 per cent.

While the removal of a cotton textile unit from Massachusetts to the South is the occasion of "scare-heads" in the newspapers, it is rare indeed that the transfer of manufacturing activities from one section of New England to another brings even passing notice in the press. The career of the Dennison concern shows conclusively that Maine's loss was Massachusetts' gain, but it is doubtful if in the columns of a single Bay State daily there has ever appeared a statement that in this instance the accession of a manufacturing concern that today employs over 4,000 people was made in Massachusetts when the operations of the Dennison unit were transferred here from the Pine Tree State.

The main factory of the concern is in Framingham, but a box plant is operated in Marlboro, a shipping tag unit, in Chicago, and a shipping and marking tag factory in London, England.

President Henry S. Dennison began his connection with the company in July, 1899, about three years after the main plant had been transferred to Framingham from Roxbury, and in 1901 he became foreman of the sealing wax department, next serving as cost and factory accountant. From 1906 to 1912 he was the manager of the works, was chosen a director of the corporation in 1909, acted as purchasing agent, from 1910 to 1913, as treasurer from 1912 to 1918, and has been president since 1917.

During the period of the World War, Mr. Dennison was a member of the commercial economy board of the Council of National Defense; Assistant Director of the division of planning and statistics, of the United States Shipping Board, and a member of the War Trade and Industries Board.

He is a director of the Service Relations Division of the United States P. O. Department; a trustee of Antioch College; president of the Taylor Society, vice president of the Boston Chamber of Commerce, and in 1919 was a member of the First Industrial Conference, and in 1921 a member of the Unemployment Conference, called by the president.

Mr. Dennison is co-author of the work "Profit Sharing and Stock Ownership for Employees" as well as the author of many articles on business, business ethics, and psychology. H. S. Dennison is president, and W. E. P. Howell, is vice president and treasurer of the corporation, which has capital of $14,000,000.

THE LAKEVIEW PRESS

In 1905, the Lakeview Press was incorporated. Six years later it occupied 4,000 square feet of manufacturing space, and by 1920, it was utilizing upwards of 15,000 square feet.

With its capital of $65,000, it employs thirty hands in the production of general printing, J. Arthur Belisle, being president, George E. Page, secretary, and Edgar H. Roy, treasurer.

THE INTERNATIONAL ENGINEERING WORKS, INC.

The International Engineering Works, Inc., succeeded the firm of Edward Kendall & Sons, which was established at Cambridgeport, about 1870. In 1900, the Robb-Mumford Boiler Company was organized to sell a special type of boiler that had been marketed throughout Canada by



INTERNATIONAL ENGINEERING WORKS, INC., FRAMINGHAM

the Robb Engineering Company, and an arrangement was made with Edward Kendall & Sons to manufacture those that were to be installed in the east. Later, the Robb-Mumford Boiler Company decided to establish a New England plant, and chose Framingham as the location because of the railroad facilities which afforded shipments to the east, west, north and south.

Simultaneous with this decision Edward Kendall & Sons found that the building of the new bridge to Cambridge cut off so much of their land area that its erection meant the entire remodelling of the plant, and they decided to sell the good-will, patterns, inventory, and mechanical equipment to the Robb-Mumford Boiler Company, which proceeded to design and erect a modern plant adapted to the construction of boilers. At that period there was not a unit in New England that had been designed and built expressly for the manufacture of boilers and steel plate work, all

having grown from small shops to which additions had been made from time to time, but without regard to economical and efficient layout.

The Robb-Mumford Boiler Company, although a United States corporation, was financed almost entirely by Canadian capital and was managed by Canadian executives. In December, 1905, the heads of the company moved to Framingham and the next month the plant started operations. One of the first contracts received was for a large number of boilers for the Wood Worsted Mills at Lawrence, and this order and two succeeding contracts provided a total of forty-two boilers for this one plant. The Framingham factory was operated by the Canadians until 1917, although all of the details of its management were handled by the local representatives, most of whom had come from the Cambridge concern of Edward Kendall & Sons.

In 1917, the local executives purchased from the Canadian corporation the plant, equipment and business at Framingham, and since that time the unit has been operated as a Massachusetts corporation, being financed and controlled entirely by Massachusetts capital. During this period a large percentage of the business has been for boilers installed in the New England states, but one special type of boiler is built which has a large market in Philadelphia and in other Pennsylvania cities and towns, and the company has filled many orders for large multitubular boilers for installation in sugar plantations in Cuba.

The plant is equipped to build all kinds of special material, but specializes on work where steel plate constitutes the major part of the construction. One line of production that has been developed in the last few years has been equipment for distributing hot road oil material on both new and old highway construction. By operating a number of different lines of work, the company has been able to maintain capacity production the greater part of the time.

While the manufacture of high pressure steam boilers predominates at the plant, it also specializes in plate work for the paper, textile, chemical, rubber, slaughtering and rendering industries.

Automobilists passing the property of the company frequently comment on the attractive appearance of the plant and grounds.

J. J. Prindiville is president and Fred W. Chipman, treasurer and secretary. The concern is capitalized for $500,000 and employs upwards of 100 operatives.

WALLACE NUTTING, INC.

Perhaps the most original and unique manufacturing enterprise yet created on the fringe of the Atlantic seaboard is the fruit of the brain of a man who began his career by serving churches as their pastor in Newark, St. Paul, Seattle and Providence, and who after being honored with a doctor's degree at thirty by a western educational institution, was turned out to grass in an endeavor to recover his health.

Determined to record, revive, and preserve all that is best in old America, Wallace Nutting conceived the idea of picturing the beautiful both in and out of doors. Accumulating 20,000 pictures, mostly in this country, with now and then a digression into Canada, Europe, and the fringes of Asia and Africa, he was the first to show the apple blossom in colors, or platinotypes, and our old homes. He delineated the lives of our forebears, with the result that today there are hanging on the walls of American homes more of these reproductions than there are flivvers in the adjacent garages. What is still more interesting, they last better than mo-

tors, since their upkeep is infinitesimal, they being hung, a fate which their author says he has thus far escaped, although some of his critics have been ready to assist in that operation.

Next there came a call for the Nutting pictures, recording as they do the beauty spots and quaint houses of old New England, and these were presented in a series of books, editions of from 10,000 to 30,000 in each volume being presented.

The study of old houses and their interiors resulted in the purchase and restoration of many, now in the hands of art and antiquarian societies, and several volumes of furniture studies, the most fully illustrated ever issued, have followed Mr. Nutting's peregrinations into this field. Interest in the fascinating form of colonial days induced Mr. Nutting to attempt to supply correct and solid reproductions, made for style, comfort, sentiment, and permanence in furniture and wrought iron, with the result that he found it necessary to establish a factory or workshop, near the Framingham railroad station, where books, pictures, furniture, iron and other commodities are produced, which in their range and quality are surprising, and where lectures are given.

During the open season for pictures, Mr. Nutting spends much of the time traversing the roads and streams, or in visiting ancient dwellings, and with the assistance of Mrs. Nutting, and Ernest John Donnelly, a talented youth, dreamy, quaint, fairy subjects, all originals are sketched for reproduction.

To set forth the worthiest in line, in period, in material, and in workmanship, all based on a broad and deep foundation of past creations, and answering the fine sentiment of our ancestors, Mr. Nutting has co-ordinated and enlarged these activities.

A unique feature in connection with Mr. Nutting's work is that no profit has ever been made on the furniture he reproduces, or on pictures for ten years, the business being carried on partly from the love of beautiful forms and partly because the reputation of his products as the best, and, in many instances, the only one of their kind, may eventually make their production profitable.

Some years ago J. P. Morgan, of New York City, supplied to the Hartford Athenaeum, the funds for purchasing the Wallace Nutting collection of furniture, the most extensive in the world covering the early period, and there it is on daily exhibition.

Mr. Nutting has become so famous that his position is not unlike that of Caesar, in connection with his birth, six places, or a village that has successively had six names, the best of which was Rockbottom, claiming the honor of being the habitat of his advent upon this mundane sphere. As he facetiously says, "the village stood still after the convulsion for forty years." He inherited from a father who made things and from a mother who dreamed them a penchant for visions and a passion to embody them. When his father lost his life in the Civil War, the son removed to Maine, where he lived for twelve years. He then went to New Hampshire where he spent three years, followed by eight summers in Vermont, seventeen years in Massachusetts, ten in Rhode Island, and seven in Connecticut, an all around record that should entitle him to know his New England. He naively adds that he "was partially educated at Exeter, Harvard, Hartford and New York," and that "between regrets for what he did and for what he did not learn the balance is about even."

In 1915, Almon F. McNally organized the McNally Building Company, and engaged in construction work, having built since that time many of

the largest mills in New England and the South, as well as numerous public buildings.

THE ARCHER-STRAUSS AND HODGMAN RUBBER CONCERNS

Few manufacturing concerns in Middlesex County have shown a greater increase in size and importance during recent years than the Archer-Strauss Rubber Company which, in 1928, added a brick and steel plant, 227 by 100 feet, one and two stories high in different sections of the extension.

The company manufactures rubberized fabrics and now employs 300 operatives, whereas but a few years ago it carried considerably less than a hundred on its payrolls. It has capital of $350,000. M. B. Kaufman is president and treasurer.

The Hodgman Rubber Company, whose officers are identical with those of the Archer-Strauss unit, employs 300 operatives in the manufacture of rubber clothing and sheeting.

In 1929, Mr. Kaufman purchased the plant and assets of the Converse Rubber Company of Malden, whose history is carried in the chapter devoted to the manufactures of that city, and, with the Corrugated Paper Mills, of Natick, he is at the head of four large Massachusetts enterprises, three of the units being leading factors in the rubber industry.

THE ANGIER CORPORATION

The Angier Corporation was organized in 1920 and is a consolidation of the Angier Mills, the Angier Mechanical Laboratories and the Mansfield Company. The merger was effected December 30, 1921, when all business was consolidated in the Framingham factory, where the manufacture of the products formerly made by the three mentioned companies is carried on. These commodities consist mainly of waterproof wrapping, shipping and building papers and crinkled papers, waterproof and non-waterproof, for similar purposes.

Edward H. Angier, the president and treasurer of the Angier Corporation, originally started business in 1895, in Quincy, under the name of the Translucent Fabric Company, which became a corporation, in 1904. In 1907 the name was changed to Angier Mills, and four years later the business was moved to Ashland, where it remained until after the consolidation was effected in 1921. Otis C. Angier is secretary of the corporation, which employs 100 operatives.

OTHER FRAMINGHAM CONCERNS

Charles F. Baker & Co., Inc., with capital of $100,000, employs 150 operatives in the manufacture of wire nails, and occupies one of the most modern steel and concrete factories in Middlesex County, having its Boston office at 42 Lincoln Street. Walter F. Baker is president, Arthur F. Baker, vice president, Grosvenor Calkins, secretary, and E. G. Sawtell, treasurer.

For generations Minard's Liniment has been produced at Framingham by the Minard Company, which has capital of $150,000, and which now produced Ol-in-ol polish, in addition to the medicinal preparation. Orris W. Nelson is president and treasurer, and Doris Nelson, secretary, of the corporation, which employs twenty-five operatives.

The Manufacturing Equipment & Engineering Company, of which S. D. Leland is president and treasurer, and R. M. Leland, secretary, employs seventy-five operatives, in the production of steel equipment, wash

bowls and drinking fountains. The Boston office of the concern is at 136 Federal Street, and the corporation has capital of $140,000.

The Framingham Foundries, Inc., take rank among the largest of their kind in Massachusetts, employing 500 men in the manufacture of grey iron castings, the heavy parts for the B. F. Sturtevant Company being fabricated there. The corporation has capital of $500,000, of which $260,000 is issued. Ex-Governor Eugene N. Foss is president, E. B. Freeman, vice president, Benjamin F. Foss, treasurer, and Horatio Alden, secretary. The plant is modern in every respect, and one of the most complete in the East.

The Gurney Heater Manufacturing Company, whose Boston headquarters are at Fort Hill Square, employs 500 men in the manufacture of heating apparatus. E. H. Gurney is president, T. E. Nordbeck, vice president and general manager, and T. W. Gladwin, treasurer and secretary of the corporation, which has capital of $350,000.

The Framingham Wood Heel Company, Inc., has capital of $100,000, and employs 100 operatives in the manufacture of wood heels. Maurice Kaplan is president and treasurer, and Benjamin Davidson, secretary.

The Independent Coal Tar Company, which has capital of $75,000, operates plants in Framingham and Taunton, in the manufacture of roofing materials and coal tar products. G. D. Murray is president and treasurer, and S. W. Meagher, secretary.

The Scranton Button Company operates a Framingham factory, in the manufacture of phonograph records. The main headquarters are in Scranton, Pa.

The Steacie Garnetting Company has capital of $50,000 and produces garnetted wool and worsted waste. Clifford Steacie is president, Curtis Steacie, vice president, and Edward Steacie, treasurer and secretary.

The Textile Soap Company, formerly of Marlboro, has capital of $65,000 and manufactures textile soaps. Walter A. Dermon is president and treasurer, and William Dermon, secretary.

The West Boston Gas Company has capital of $2,100,000 and employs 125 operatives in the production of gas. T. C. Fales is president, N. C. Fales, secretary, and Vincent Goldthwaite, treasurer.

The Framingham Lumber Company, of which Harry T. Fales is president, Frank H. Fales, vice president, Herbert A. Fales, secretary, and Arthur E. Bent, treasurer, has long been the leading lumber concern of Framingham. The corporation has capital of $30,000.

The Freeman McKay Shoe Company employs 250 operatives in the manufacture of women's McKay shoes, the partners being Robert W. McKay and Joseph Freeman. The Boston office of the corporation is at 153 Lincoln Street and it has capital of $50,000.

The reputation of the Eames Wheel manufactured in Framingham, is one of the traditions of Massachusetts, and even today, with the passing of the horse and buggy the estate of A. M. Eames, with Chester H. Eames, operating as A. M. Eames & Co., manufactures wagon and auto wheels, employing thirty men.

The Continental Valve & Equipment Company whose main office is Chicago, operates a factory in Framingham, where forged steel castings and pressure governors are fabricated. The corporation has capital of $500,000. Olaf E. Oleson is president, James W. Johnson, vice president, Patrick J. Daly, treasurer, and J. E. Lenkner, assistant treasurer.

The Williams & Bridges Company of Worcester operates one of its two Massachusetts factories for the manufacture of wooden and paper

boxes in Framingham, the corporation employing 150 hands in both plants.

The William Bent Counter Company owned by William Bent manufactures shoe counters, and employs twenty-five operatives.

The F. S. Carr Company with capital of $1,000,000 employs 250 hands in the manufacture of auto top material and rubberized fabrics, the Boston office of the concern being located at 31 Beach Street. Thomas H. Dumper is president, H. K. Johnson, secretary and M. F. Carr, treasurer.

The Framingham Pattern Works, owned by I. C. Moore, is engaged in the production of wood patterns and wood commodities.

The Wellesley Shoe Company employs 125 operatives in the manufacture of children's, misses', girls', and women's novelty McKay shoes.

Harry Stein is president and treasurer, William Fielman, vice president, and Bertha Stein, secretary.

In 1929 the Framingham Shoe Company was organized and began the manufacture of women's shoes, employing fifty operatives at the outset.

NEARLY A CENTURY AGO—AND NOW

In 1837 the capital invested in the manufacturing enterprises of the town amounted to $415,000 and the local concerns employed 105 males, and 141 females. Thirty-eight years later (1875) the invested capital of local plants was $800,000, the value of goods produced $850,000 and 263 males and 268 females were locally employed in industry. It is interesting to contrast the situation of ninety years ago, with that of today, and with the figures of a little more than half a century since.

In 1927, the forty-one manufacturing establishments of Framingham used stock and materials valued at $13,095,258, paid wages of $5,705,442, to 3,992 employees, and manufactured products valued at $24,236,252, or more than fifty-eight times the value of ninety years ago, and almost twenty-nine times the figures of fifty-two years ago.

GROTON

In 1832, a mill was erected on Squannacook River, not far from the village of West Groton, in the town of Groton, where the manufacture of starch from the local surplus potato crop was undertaken without success.

It was in 1832 that Jephtha R. Hartwell bought this water privilege, and plant, and began the manufacture of paper, the mill-site being that where one of the two Massachusetts paper mills, owned by the Hollingsworth & Vose Company, is located today.

In 1835, Hartwell sold the plant to Thomas A. Staples, who carried on paper manufacture until 1839, when Messrs. Phelps and Stafford became the owners. They had been engaged in the production of paper-making machinery, in Connecticut, and in 1830, had constructed a complete cylinder machine which enabled the operator to take pulp in at one end and turn out paper at the other, ready for finishing and packing. Stafford disposed of his interest in 1840 to Messrs. Phelps & Bellows, and between that time and 1846, when the plant was burned, Hartwell who had again come into possession of the property, rebuilt the mill, and in 1852, sold it to Lyman Hollingsworth.

At that time, the manufacture of paper, like the making of many other commodities that were produced before the age of machinery, was a finely skilled handcraft, and the rope and jute types made by Hollings-

worth soon became a standard of the period, consisting principally of tag and pattern papers, and for sanding and wrapping purposes. They were marketed throughout New England, and even prior to the days of the Civil War were known and used in foreign markets, and the high reputation achieved by Lyman Hollingsworth has been held to this day by his successors—the Hollingsworth & Vose Company.

It is of peculiar significance that today those engaged in research, in the expectation and hope of uncovering some new and practicable raw material for paper manufacture to supplement rags and pulpwood, should, in their reports, have harked back to the discovery of the possibilities in manila fibre made by John Mark and Lyman Hollingsworth, to whom a United States patent was issued on this process, in 1843—another contribution typical of Yankee ingenuity, and comparable in the paper production field to Eli Whitney's cotton gin in cotton production, and Elias Howe's sewing machine in the shoe manufacturing industry. The present day uses of manila and jute-fibre papers are manifold, and their place in the economic structure of the nation is that of a necessity. In the flour-milling industry huge quantities of manila rope paper are used in the manufacture of the familiar flour containers, and this is but one illustration of a myriad of uses to which the discovery of the Hollingsworth brothers has been applied.

In 1871, Zachary T., son of Amos Hollingsworth, and a grandson of Mark, who had learned the art of paper-making in Lyman Hollingsworth's plant at West Groton, bought the so-called Kennedy mill, in East Walpole, from Francis W. Bird, of Bird & Son. It was then equipped with a 48-inch machine, which had a capacity of 2,000 pounds of paper a day. When the plant was destroyed by fire on September 22, 1873, it was at once rebuilt, and a 62-inch cylinder machine, produced by Rice, Barton & Fales Company, of Worcester, was installed.

Two years later, Charles Vose, who had been employed as a salesman by the wholesale paper firm of B. H. Thayer & Company which was the selling agent of Lyman Hollingsworth's West Groton and Bridgewater paper plants, entered the employ of Zachary T. Hollingsworth, as salesman, and in 1881 became an equal partner in the firm of Hollingsworth & Vose.

The increase in business was so rapid that the firm bought that year the West Groton plant from Lyman Hollingsworth, which at that period was equipped with a 56-inch Fourdrinier machine, having a daily capacity of 6,000 pounds.

Prior to 1890, the East Walpole plant was enlarged to a three-machine mill by the addition of two machines—one of 55-inch and the other of 80-inch, while the 62-inch machine was changed from a cylinder to a Fourdrinier type.

In 1892 the Hollingsworth & Vose Company became a corporation, Z. T. Hollingsworth being elected president, Charles Vose, vice president, and E. Frank Baker, treasurer.

On April 4, 1904, the East Walpole plant was again visited by fire, which partially destroyed it. The 62-inch machine was rebuilt and removed to the West Groton plant on March 20, 1905, and a 90-inch Fourdrinier machine was installed at East Walpole. In 1906, the 84-inch four-cylinder machine was replaced by a 110-inch combination cylinder and Fourdrinier, at East Walpole, and subsequently the 84-inch machine was installed at West Groton, making that plant a three-machine mill.

Upon the death of Treasurer Baker, on October 22, 1912, Valentine

Hollingsworth, son of Zachary T., who had been connected with the East Walpole mill for four years, and prior to that had been employed in the Waterville, Maine, plant of the Hollingsworth & Whitney Company, was chosen to succeed him, and Robert W. Lennox, who had been with the company for twenty years, was elected assistant treasurer.

In 1908, Louis E., son of Charles Vose, who had been employed at the East Walpole plant for ten years, during nine of which he had served as superintendent, became manufacturing manager of both plants.

In 1921, Z. T. Hollingsworth and Charles Vose retired as president and vice president, respectively, and Valentine Hollingsworth became president, and Louis E. Vose, vice president, Mr. Lennox, treasurer and purchasing agent, and Thomas Compton Walsh, sales manager, all four holding these positions today. Up to his death on April 1, 1925, Z. T. Hollingsworth served as chairman of the board of directors, and Charles Vose, who had assumed charge of sales from the organization of the original firm, up to 1921, succeeded to the position of chairman of the board.

The concern has expanded its production steadily until today it is the largest manufacturer of rope paper in the United States, and probably the largest in the world. Its famous electrical papers are without a peer and maintain the old traditions in the manufacture of extra strong rope and jute papers, Fourdrinier and cylinder sand papers, extra strong rope tag stock, and numerous other types whose exacting specifications are paramount.

When operating at capacity, the East Walpole plant has a daily output of 60,000 pounds, while 50,000 pounds can be turned out at West Groton every working day.

The company maintains its general offices at 333 Washington Street, Boston, employs 525 operatives, and has capital of $600,000.

The Nashua River Paper Company, of which George T. Keyes is president and treasurer, and B. M. Kimball, secretary, operates a plant in Groton, for the manufacture of Kraft paper, in addition to the main mill, in Pepperell.

It was on the site of this plant that a paper mill was established, in 1841, where a dam had been built half a century before. The corporation has capital of $250,000 and employs 350 operatives at two mills.

The Groton Leatherboard Company employs 100 operatives in the manufacture of matrix paper, leatherboard and fibreboard, at its plant in West Groton. Winthrop L. Sheedy is president, C. A. P. Lawrence, vice president, and Michael Sheedy, treasurer and secretary. The corporation has capital of $30,000.

A. H. Thompson & Sons Company, of which E. H. Thompson is president, D. B. Thompson, clerk, and C. L. Thompson, treasurer, employs twenty hands in the production of wooden heels, cores and frames.

HOLLISTON

In 1793 Col. Ariel Bragg began the manufacture of shoes, in Holliston, producing twenty-two pairs, which he slung across the back of a horse, and driving to Providence, R. I., he sold the lot for $21.50—a figure somewhat below the prices of 1930.

From 1800 to 1810 Hezekiah and Jonathan Bullard were local shoe manufacturers, and were followed by Timothy Rockwood, Messrs. Currier & Littlefield, the Messrs. Batchelder, and others, two local tanneries supplying the leather.

By 1874 the town had ten large shops, whose annual output approximated $1,000,000.

As early as 1803 Elihu Cutler built a mill for the manufacture of thread, the plant later becoming a woodworking unit.

The manufacture of straw hats was begun in 1815 by Charles and George Leland, and in 1862 the largest local plant engaged in this type of production, was erected.

In 1827, Prescott Littlefield began the manufacture of coach lace.

In 1835, Messrs. Houghton & Joslyn began the manufacture of copper pumps, and were followed by George and Charles Wilder. In 1915, Arthur W. Jones bought the S. Wilder Pump Company the successor of the concern set up in 1835, and manufactures copper pumps there today, marketing them throughout the United States and Europe.

In 1874 George B. Fiske began the production of knitted commodities and in 1881 the Holliston Mills were established to manufacture blankets.

In 1906 the plant of the Shawmut Waxed Paper Company was moved to Holliston, from Boston, and now employs forty operatives in the manufacture of plain and printed waxed paper, Arthur W. Morse being president and treasurer, George N. Lovatt, vice president and manager, and Harold B. Read, secretary, of the corporation. Mr. Moore, the founder, holds the unique distinction of having conceived and set up the oldest concern in this country dealing in this type of commodity. Although two other concerns had previously engaged in the same general field, they do not produce the same class of goods as the Shawmut unit. The corporation has capital of $10,000.

Robert B. Peckham formed the Berkshire Footwear Corporation in 1922, with capital of $50,000, and began the manufacture of moccasins. C. H. Day is president, L. H. Cox, vice president, A. E. Snyder, secretary, and Mr. Peckham, the founder, is treasurer.

The Goodwill Shoe Company succeeded the Arthur A. Williams Shoe Company and employs 300 operatives, taking rank as Holliston's largest industry. It is owned by Arthur A. Williams and maintains a Boston office at 72 Lincoln Street. It has long specialized in footwear for farmers, trainmen, truckmen, foundry and mill employees, and for outdoor sports. For a number of years it operated the Holliston plant at about sixty per cent of its capacity, because the owner believed it advantageous to purchase quantities of the class of shoes made there from outside producers, but beginning in the fall of 1929 this policy was abandoned, and the concern returned to normal production and is now occupying all of its available factory area.

In 1929, the Hodgson, Gladwin Company was incorporated, and is engaged in the manufacture of cotton, woolen and worsted goods.

HOPKINTON

It was in 1820 that Thomas Walker, of Hopkinton, introduced the wooden peg, a small but revolutionary device in the manufacture of footwear. Previous to its appearance all shoes had been hand sewn, but it was not long before eighty-five per cent of all footwear was pegged.

This invention, like its countless successors, vastly expedited the production of shoes, lowered the prices, and enhanced the consumption.

Walker and his five sons, and the firm of S. & J. Crooks were numbered among the local shoe manufacturers of that period.

In 1860, the senior Walker erected in Holliston what at that time was the third largest boot and shoe factory in Massachusetts.

Lee Claflin, the father of Hon. William Claflin, who served as Governor of Massachusetts from 1869 to 1872, established a shoe factory, in 1840.

In 1855 the value of boots and shoes produced in Holliston was $1,058,837, and 1,321 employees were engaged in the various factories.

In 1882 a disastrous fire destroyed several plants, including that of Bridges & Company then the largest local shoe manufacturing unit. Three years later, while the value of local shoe products was $1,562,820, only 901 employees were carried on the rolls, indicating that some of the concerns did not rebuild.

THE SEAMANS & COBB COMPANY

Those who hold that the future offers nothing to men who choose to make industrial investments in Massachusetts, may find something of substance upon which to chew for quite a period by analyzing the activities of the Seamans & Cobb Company, of Hopkinton. On July 1, 1908, the concern started in business, succeeding Nash & Seamans, who had been engaged in manufacturing shoe fabric and patent leather for approximately sixteen years previously, the junior partner remaining active, while the senior partner disposed of his interest to Francis S. Cobb.

Two years later, the Seamans & Cobb Company started manufacturing threads in Sharon, but the business developed so rapidly that a removal to Framingham appeared desirable, and a considerable amount of space was leased in one of the industrial buildings, in that town. In 1918, these quarters were outgrown and a removal was made to a Hopkinton mill, where 36,000 square feet of manufacturing floor space were afforded.

During the first ten or twelve years of the industry, the concern imported a large yardage of fabrics for shoe toppings, as well as for operating the thread mill, but this business being thrown into the discard with the changes in styles of women's shoes, the company turned to sewing threads of its own manufacture for shoes, leather, clothing and other textile industries, and today 95% of its production is along these lines.

For the first year of business the sales amounted to approximately $60,000, while today they are $1,000,000 a year, and all this increase in less than a twenty year period. In 1917, Mr. Seamans retired from active business and Mr. Cobb is in sole charge of the company's affairs. Branch offices have been established in Los Angeles, St. Louis, Chicago, Gloversville, N. Y., and Cincinnati, and the company markets many of its products in foreign countries.

The hundred operatives are employed; the corporation has capital of $194,000 and it operates 1,500 twist spindles. Francis S. Cobb is president and treasurer, Robert Wilson, vice president, and Clarence L. Newton, secretary.

The Stewart Company, Inc., manufactures auto truck bodies, at its plant, in the village of Woodville, in Hopkinton and employs twenty-five operatives. P. B. Stewart is president and treasurer. In the days of the horse and buggy the village of Woodville was famous for the manufacture of high-quality vehicles and sleighs.

HUDSON—FAMOUS FOR ITS SHOES

In 1816 Daniel Stratton began shoe manufacturing in Hudson, disposing of his interests to his son, Lorenzo, who, in turn, sold to William Brigham, and from that time to 1911 the name of Brigham was actively identified with the town's leading industry.

In 1854, Stow, Bills & Hawley established a factory, and three years

later George Houghton built a shoe shop 60 feet long, and three stories high, which was extended to 100 feet the following year, and in which he installed steam power, being the first local manufacturer to employ that type. In 1863, the Houghton factory was moved to a new site and enlarged.

In 1857, the F. Brigham factory was built; two years later L. T. Jefts began the manufacture of shoes, and in 1865 W. F. Trowbridge erected a factory.

THE FIRESTONE FOOTWEAR COMPANY

In 1885, Hon. Lewis Dewart Apsley and J. H. Coffin formed the firm of Apsley & Coffin, took over an idle gossamer factory, and engaged in the manufacture of underclothing, the name of the concern being changed later to the Goodyear Gossamer Company. Within five years, the original factory was enlarged three times, and when burned, sixteen acres of land were purchased and a brick plant erected which at the outset contained three acres of floor space. Production was changed to mackintoshes, and in 1892, Mr. Apsley purchased Mr. Coffin's interest, and incorporated the Apsley Rubber Company, adding rubber boots and shoes to the products. In 1903 a six story brick addition was built, and in 1915 a four story structure was erected.

In 1920 the Firestone Tire & Rubber Company, of Akron, Ohio, acquired a controlling interest in the concern, and the following year the corporate name was changed to Firestone-Apsley Rubber Company. Rubber and canvas footwear constitute the products.

The concern is capitalized for $3,000,000 and Harvey S. Firestone is president and general manager, C. H. Baker, vice president and secretary, and Alden Strong, treasurer. In 1926, the unit was incorporated as the Firestone Footwear Company.

Many plant extensions have been made and much additional equipment has been installed under the Firestone regime, and the concern has ranked for many years as the town's most dependable and fastest growing industry. The plant now possesses 268,500 square feet of manufacturing space, and employs 2,000 operatives.

THOMAS TAYLOR & SONS

In May, 1882, Thomas Taylor, manufacturer of shoe goring, in Derby, England, came to the United States, having been led to such a step by the decline in his business due to the fact that in his native country the Congress boot was passing out of fashion, even as it was in the United States.

He was descended from a family of silk weavers in Middleton, Lancashire, England, and early in life he went to Derby where he became a weaver of shoe goring, and subsequently a manufacturer of that product. Skillful at his trade, he early developed shoe goring of exceptionally fine texture, with silk and wool face, and his inventive mind led him not only to bring out new weaves, but to design and build looms for their manufacture.

It is interesting to note that when he landed in New York, in 1882, he wore a pair of shoes with a combination of laced front and elastic gored sides, which he had made in England, a type of footwear which later was patented by others in the United States, and became known as the Marshall Congress.

Learning soon after his arrival that the variety of weaves in goring here was limited, his consuming ambition was to develop high class gorings, and to carry out his purpose he designed and introduced the double shuttle cross shot goring loom, which was manufactured under his supervision, in Philadelphia. Securing some looms from England, he started a factory in Camden, N. J., and later removed to Easthampton, where, at the plant of the Glendale Elastic Fabric Company, he introduced new ideas in making high-grade webs of double shuttle weaves.

In 1886 he again started manufacturing goring, occupying the old factory at Glendale Village, which had been abandoned some years before by the Glendale concern when it removed from that location to the center of the town. Three years later, through the efforts of the Hudson Board of Trade, he removed his business to Hudson, where it is still carried on under the name of Thomas Taylor & Sons.

For a number of years after the concern was established the Congress shoe was popular. Then it went out of fashion as it had in England previously. The manufacturers of goring commenced to drop out of the business one by one, but the development of Romeo and Juliet slippers, and a continued small use of Congress shoes provided a limited demand for goring. Thomas Taylor & Sons stuck to the ship in spite of the decline in the industry and by developing new looms and systematic methods of manufacture, grew and expanded. Shoe goring is being made in the United States today only by a few elastic web manufacturers who produce principally other kinds of elastic webs, and Thomas Taylor & Sons is the only concern in the industry which confines its plant exclusively to the production of shoe goring.

Upon the death of Thomas Taylor, in 1923, his eldest son, Frank, took over the business and now operates it.

It is a peculiar coincidence that, while the English speaking countries have practically discarded the Congress shoe, the Latin countries and a few others still wear this type. During the World War, Thomas Taylor & Sons developed a foreign trade which, together with the more recent popularizing of gored shoes for women in the low and fancy variety, makes a fairly good demand for shoe goring.

In 1927, Thomas and Frank Taylor gave to the town of Hudson a beautiful memorial bridge, connecting Apsley and Wood Parks, across the Assabet River and "Dedicated to those loyal sons and daughters of Hudson who have in the past made the supreme sacrifice, or may in the future give their lives to their Country, in the spirit of freedom and justice and that righteousness and enlightenment may prevail throughout the world."

Associated in business with Frank Taylor, the oldest son of the founder, is Robert Taylor Dawes, grandson of Thomas Taylor, and nephew of Frank Taylor. Recently the concern bought the Adjustable Spinning Band Company of Worcester, and moved the equipment to Hudson, adding a line of shoe laces which is sold directly to the shoe trade, in addition to adjustable spinning bands for cotton and woolen mills, and also elastic braid.

The company's commodities are used in all parts of the United States where shoes are made, as well as in foreign countries.

In 1891, Charles J. Sawyer purchased the factory which he continues to operate in the production of wooden and paper boxes, fifty employees being carried on the payroll.

THE HUDSON WORSTED COMPANY

In July, 1895, Henry T. G. Dyson, then residing in Newton, determined to try an experiment in the worsted field, and removing to Hudson, set up in the idle Brigham shoe factory, two cards and two combs, and opened the first strictly commission combing plant in the United States.

The next year, he incorporated the Hudson Worsted Company, and within three years he found it necessary to enlarge his facilities. Purchasing a tract of land on Broad Street he erected a brick mill, 200 by 60 feet, four stories in height, to which many additions have since been made, until today the concern employs 300 operatives engaged in the combing of wool for worsted spinners.

Ploughing back the earnings, another brick structure was built in 1917 and the company occupies 50,000 square feet of manufacturing space, in which twenty-six carding and twenty-five combing machines, and other collateral equipment are in operation.

The corporation has capital of $375,000, and Mr. Dyson is its president and treasurer and Ralph Fieldsen, its secretary.

The Hudson Combing Company, of which E. Lester Larkin is president, and Mr. Dyson is treasurer and secretary is another of the latter's enterprises, being capitalized for $25,000, and employing twenty-five operatives in wool combing.

Mr. Dyson is a director and stockholder of the Wottoquottoc Worsted Company, of Hudson, and was a leading member of the Massachusetts Legislature for four years.

Responsible for establishing two textile enterprises in the town within the last thirty-five years, where none existed before, he holds the position of being the largest resident employer of labor.

THE UNIVERSAL BORING MACHINE COMPANY

In 1907 the Universal Boring Machine Company was incorporated, with capital of $15,000, which has since been increased until today it stands at $200,000. The officers of the company spent many years in experimental work until they developed a product that represented quality and efficiency, ultimately placing upon the market the Universal horizontal boring machine—the first of its type to be designed, manufactured and advertised, with a "tri-way" bed, thus making the greatest advance in boring machine design in more than twenty years.

The bed of the "tri-way," from which the machine gets its name, is provided with three flat ways for supporting the carriage and rear post base. This construction makes possible a width of bed nearly equal to the cross travel of the standard table, and greatly reduces table overhang and its resultant vibration. The bed is carried completely under the gear boxes, and space is provided just back of the gear boxes for mounting the motor. Overhang of these parts is therefore eliminated, and any vibration is transmitted directly to, and absorbed by, the foundation. The bed is heavily ribbed throughout to provide against distortion under heavy cuts, and is arranged with chip chutes for the convenient removal of the chips.

To provide for the coolant the top of the bed slopes towards the head, and a suitable reservoir is provided directly below the motor base. Provision is made for mounting the pump on a milled pad on the end of the bed, the pump being driven by a belt from a pulley turned on the hub of the driving sprocket.

These machines are produced in three types,—the No. 24, the No. 30, and the No. 44—the first weighing, in crate for shipment, about 11,500 pounds, the second about 15,700 pounds, and the third, about 18,000 pounds.

The Universal precision machine aligning levels followed and the company's products are used by such representative concerns as the General Electric Company, the Westinghouse Electric & Manufacturing Company, in nearly all the plants of the General Motors Corporation, while a large number of machines have been installed in the tool and die plants, in Detroit, Mich., that are engaged in the production of tools, dies, and fixtures for the automobile concerns. The freight charges that are paid by the customers on the machines shipped from Hudson have no effect on the local company's competition with machines manufactured in the Middle West.

Charles A. Clarke, of Newton, has been president, treasurer and general manager of the concern since its incorporation and within recent months the company's products have largely entered into the leading industrial and railroad plants throughout the United States. The concern employs seventy-five operatives.

In 1929, owing to a great increase in the company's business, the plant erected just before the World War by J. N. Lapointe, and designed for a machine shop, and which was acquired by the General Electric Company and used as an emergency unit for the manufacture of small motors during the war, but which had been idle for ten years, was bought by the Universal Boring Machine Company which immediately installed equipment for the building of horizontal boring machines.

A spur track was laid directly into the plant, which from an industrial standpoint is one of the most attractive mill buildings in Middlesex County.

THE LOCAL MARCH OF THE TEXTILES

In 1912, the Wottoquottoc Worsted Company was incorporated, and today has capital of $225,000. The plant is equipped with 8,000 worsted and 4,000 twist spindles and employs 155 operatives in the manufacture of knitting yarns and warps. E. P. Larkin is president, E. Lester Larkin, secretary and James H. Hancock, treasurer.

The Hudson Batting Company owned by Arthur H. Rodgers and the heirs of the late William Rodgers, employs twenty operatives in the manufacture of fibre felts.

The town of Hudson affords an excellent example of a manufacturing community which from its inception to approximately the beginning of the present century was almost exclusively engaged in the manufacture of one commodity—shoes, turning to diversified products, and particularly to textiles.

There have come into existence within its borders within the past thirty-five years half a dozen textile concerns, whose aggregate capital is approximately $800,000, and which today are employing 600 or more operatives, and three metal-working industries, with capital exceeding $400,000, and employing more than 200 workers, with aggregate payrolls that undoubtedly exceed those of the shoe concerns that flourished in the nineteenth century. What is still more favorable is that the diversification of the local industry spells more dependable business conditions than prevailed when production was confined to one line of manufacturing. The town still boasts of some sizable shoe manufacturing units.

Within the past dozen years two large factories have been erected—the plant of the Hill Brothers with capital of $80,000, which employs 150 operatives in the manufacture of shoes, Lawson T. Hill, being president, and Clark B. Hill, secretary and treasurer, of this concern, which has a Boston office at 155 Lincoln Street; and the plant of the Corbin-Holmes Company formerly the McElwain-Holmes Company where women's footwear is produced. This new concern is an amalgamation of the B. A. Corbin & Son interests with those owned by Herbert S. Holmes and was accomplished by the raising of a $50,000 found for the purchase of the real estate by the Factory Realty Corporation, of Hudson, the Corbin-Holmes Company acquiring only the going business and factory equipment of the former McElwain-Holmes Company. The latter corporation was incorporated in 1927, with capital of $100,000.

OTHER LOCAL ENTERPRISES

The Lapointe Machine Tool Company is another twentieth-century concern that has added materially to Hudson's industrial productivity. Housed in a modern brick plant, it employs upwards of 100 skilled mechanics in manufacturing broaches, broaching machines and tools. It has capital of $200,000, J. J. Prindiville is president and treasurer, J. J. Prindiville, Jr., vice president and C. H. Vaughn, secretary.

I. Foulds & Son, Inc., with capital of $50,000, is engaged in the manufacture of textile leather products, George C. Foulds being president and treasurer, and Arthur H. Damon, secretary.

The Hudson Counter Company manufactures shoe counters, and top lifts, has capital of $30,000, and employs forty operatives. Henry B. Whitcomb is president and treasurer, and Arthur F. Greenwood, secretary.

The Smith-Crawford Shoe Corporation, is engaged in the production of children's shoes, and employs 125 operatives. The corporation has capital of $25,000. Walter H. Fairfield is vice president, E. Stanley Smith, treasurer, and C. S. Champney, assistant treasurer and secretary.

Tower Brothers, owned by Charles Tower, manufactures shoe machinery, and the Hudson Machine Screw Company produces machine screws.

The Hudson Printing Company, which has a Boston office at 146 Summer Street, employs thirty-five in carrying on general printing, E. F. Worcester being president and treasurer, and the Larkin Lumber Company, with capital of $65,000, employs twenty hands, E. P. Larkin being president with E. L. Larkin secretary and treasurer.

LEXINGTON

On August 22, 1922, three brothers, Charles Elliott, Elinus B. and Earle L. Hadley, all of Lexington, incorporated The Hadley Press, Inc., and began publishing the *Lexington Times,* in a 9x12 office, located in a barn, with no more equipment than a 7x11 Pearl press, a few fonts of type, and an unlimited amount of courage. In two and a half years eleven expansions of space were made, and in 1924 Charles E. Hadley became the sole stockholder, as well as being the president, general manager, editor, reporter and advertising solicitor. In 1924, the company published the "Lexington Town Directory," and in 1927 the company purchased the *Lexington Minute-Man,* a weekly newspaper that had been published in the town for fifty-six years, the two sheets being combined under the title of *Lexington Times-Minute-Man.* Today, the company owns its intertype,

cylinder and job presses, and miscellaneous equipment. Charles E. Hadley is secretary of the Massachusetts Press Association.

The Jefferson-Union Company, with capital of $600,000, employs upwards of 100 operatives in the manufacture of malleable iron pipe fittings. The concern also operates a foundry and machine shop in Lockport, N. Y. Charles H. Stebbins is president and Arthur W. Freeman is treasurer and clerk. The company's sales office is located at 11 West Forty-second Street, New York City.

The Lexington Sand & Gravel Company of which George F. Rouse is president and Paul M. Wagner is secretary and treasurer, produces sand and gravel and has capital of $20,000.

M. H. Merriam & Company, owned by Edward P. Merriam, manufactures cotton stays and bindings, leather trimmings and rayon specialties.

LITTLETON

In 1883, Waldo E. Conant and Daniel G. Houghton formed the firm of Conant, Houghton & Co., to manufacture narrow elastic webbing, and, in 1914, the concern was incorporated. Numerous additions have been made to the original plant, and modern machinery installed. A branch factory was established in Lowell several years ago, and when the merger of elastic fabrics units was effected, in 1927, the corporation became a part of the United Elastic group. Two hundred and fifty employees are carried on the rolls of the Littleton and Lowell plants.

Judge Edward L. Shaw, of Northampton, is president, William L. Pitcher, of Easthampton, is treasurer, H. W. Conant, assistant treasurer, and George W. Astill is manager of the Littleton and Lowell units.

MAYNARD

That every cloud has a silver lining is self-evident when one studies the industrial growth of the town of Maynard. In all probability, the municipality would have remained a strictly agricultural community as it had been for decades prior to the advent of William H. Knight, of Framingham, in 1846. His carpet factory and water privilege on Cochituate Brook, had been acquired by the City of Boston for a water supply, and Mr. Knight set about to secure a new location for his enterprise. He was attracted by the resources of the Assabet River, and interesting Amory Maynard in the proposition they gradually began acquiring realty in the heart of the town until they had purchased 109 acres of land. In 1847 the first wooden structure was erected, 100 by 50 feet, in which yarn was made, and soon afterward manufactured into carpeting on hand looms.

A few years later Knight retired, and Maynard continued the business, but was carried down in the cataclysm of 1857.

Two years later Mr. Maynard acquired the Fort Meadow reservoir, of 300 acres, in Marlboro, and having obtained control in 1846 of Bowe's Pond, of 200 acres, in Stow, he then possessed unrestricted rights to the water resources of the Assabet Valley, and in 1862 the Assabet Manufacturing Company was reorganized as a corporation, with F. A. Goddard, as president, T. Quincy Brown, as treasurer, and Amory Maynard, as agent. A new building was erected, new machinery installed and the production was changed from carpetings to blankets, flannels and cotton cloth. The business was successful, and many plant additions followed, while a group of tenement houses was erected.

When the original concern completed its first year's business, in 1847,

it was found the value of the products was $150,000. Forty-three years later, when Amory Maynard died the Assabet Manufacturing Company was annually producing textile fabrics valued at $1,500,000.

On December 31, 1898, the concern was declared insolvent, and receivers operated the plant until May 1, 1899, when the American Woolen Company purchased the assets for approximately $400,000.

At that period the plant ranked as the largest woolen mill in the United States, sixty-six sets of cards and 350 broad looms being operated at the time.

In 1901 the new management erected a new brick mill 700 feet long, and in 1918, still another, 500 feet long, as well as a large brick storehouse, and installed a steam turbine engine. A brick office building was built in 1905. Today the plant includes twelve large brick buildings, in which are housed 128 sets of 60-inch cards, and 760 broad looms, while 2,500 hands are normally employed.

Since 1847 the mill has been the only manufacturing unit of any size in the town, and the business of the community has revolved around it.

NATICK—HOME OF HENRY WILSON, THE COBBLER-STATESMAN

For more than a century Natick has carried on the manufacture of shoes. As early as 1828, Edward Walcott was carrying on production on a large scale, and, in 1856, he sold 150,000 pairs of footwear.

John Walcott, Isaac Felch, Hanchett & Company and others were among the early shoe producers in the town.

J. L. Woodman opened his factory, in 1850, and he was followed two years later by Travis Brothers. The firm of Riley, Riley, Pebbles & Company began business in 1853, and Felch Brothers were established five years later.

But no shoe worker or producer of the olden or modern days in this or any other state rose to greater fame than Natick's eloquent cobbler, who, after a career in the Massachusetts Legislature, swept the Commonwealth in a popular election for the United States Senate, in 1854, and served in that office from 1855 until 1873—a period of eighteen years—when being chosen Vice President of the United States, at the national election, in 1872, as the running mate of Gen. Ulysses S. Grant, he assumed that position, dying while in office, in November, 1875.

Henry Wilson was born in Farmington, N. H., on February 12, 1812, exactly three years to a day after the birth of America's best loved soul—Abraham Lincoln.

He was christened Jeremiah Jones Colbath, but at the age of twenty-one, by an act of the New Hampshire Legislature, his name was changed to Henry Wilson.

That year he removed to Natick, with no money, but with that gift that is more priceless than lucre—an eager desire to labor. For two years he worked in the little shoe shop, which still stands at the corner of West Central and Mill streets, in the town, and under the tutelage of the owner, learned the art of making shoes.

He then returned to New Hampshire to complete his scholastic education, and became a student in the academies at Strafford, Wolfboro, and Concord, which were scarcely comparable to the junior high schools of this era. But before he had fulfilled his ambition to gain the rudiments of an education he lost his meager savings, which had been placed in trust in the hands of a friend, who failed in business, and he was forced to return to Natick to resume shoe cobbling.

The little factory where he worked and which in 1928, after the lapse of nearly a century since he made it famous, was purchased by the town of Natick, together with two acres of land surrounding it, placed in the hands of the Park Department, and will be developed as a public memorial to which visitors may come and sit at this shrine of the Natick cobbler-statesman.

For years past it has borne on its West Central Street facade a modest sign:

"In this little shop, Henry Wilson, Vice President of the United States, learned to make shoes. He was known as the Natick cobbler."

Faded and evidencing the wear and tear of the storms and the sunshine of a hundred years, the dilapidated structure, of a single room, with windows and a door, a remnant of a chimney, it is typical of the shoe factories that dotted almost every town in the Commonwealth a century ago. It was of size sufficient to shelter the cobbler, and his apprentice, and, perhaps a visitor or two, who dropped in to discuss the affairs of a nation and current events, besides the bench, tools, and even the primitive bed which constituted a part of the equipment of these little shops.

In the famous presidential campaign of 1840, when William Henry Harrison and John Tyler were engaged in enunciating their political principles to the American people, Henry Wilson made forty speeches in behalf of "Tippecanoe and Tyler, too," which won him a reputation as one of the great orators of the day, and largely because of his forensic abilities he was elected to the Legislature.

A close friend of John Greenleaf Whittier, the poet, and a profound and enthusiastic abolitionist, he participated in the state and national campaigns until finally he became a candidate for the upper branch of Congress, and, in March, 1861, six years after he entered the Senate, he was chosen chairman of the Committee on Military Affairs, a position he held during the entire period of the Civil War. Naturally this important office brought him in close personal touch with President Lincoln, and he was regarded as one of the latter's advisers. Wilson was so imbued with the righteousness of the Union cause that while still serving as a Senator, he recruited a regiment of infantry, and led it to the front. In 1872, he received 286 out of the 354 votes in the electoral college for vice president, and presided over the deliberations of the United States Senate, of which he had been a leading member for almost twenty years.

Not only did he possess extraordinary oratorical abilities, but he was universally admired for his unusual courage, his deep convictions upon moral and social issues, and his unblemished personal character.

BASEBALLS AND FOOTWEAR

Natick has been famous as a town where the manufacture of baseballs has been carried on continuously since 1858, when the concern today known as H. Harwood & Sons, Inc., was formed. Capitalized for $300,000, fifty hands are constantly employed, R. W. Harwood being president and treasurer of the corporation.

Best & Company began the manufacture of shoes, in Natick, in 1872, and for fifty years, from 1873 to 1923, Charles W. Dean was locally engaged in the production of shoes. In 1896, he purchased a factory in Cochituate, which he sold when he constructed a modern plant, in Natick. This unit he disposed of in 1920, and built a large brick plant which he continued to operate until 1923. From a small business of a few dollars a week he developed a concern whose sales rose to $2,000,000 a year.

THE WHIPPLE COMPANY

In the early nineties H. L. Whipple, then engaged in the meat and provision business, in Natick, conceived the idea that he could manufacture a better quality of mince meat than he was then buying to resell to his customers, and he began gathering favorite family recipes, and, after long experimentation, produced a commodity that proved so successful with the trade that he retired from the retail business, and devoted all of his time to the manufacture of the commodity.

His next step was to find a suitable name and, after much thought, he determined to name the product "Grandmother's" in honor of his grandmother, Mrs. Deacon Tuttle, of Littleton.

The only picture which the family had was an old-fashioned daguerreotype picturing the venerable woman in lace cap, mits, and shawl, which were so commonly worn seventy-five years ago.

A copy was made and ever since has been used on the face of packages containing Grandmother's Condensed Mince Meat which the grocers of New England have been offering the public for more than three decades.

Associated with Mr. Whipple was his son, Lewis E., then a high school boy, who helped his father after school, Saturdays and during vacations.

Following the death of the founder, Lewis E. Whipple assumed charge of the business and has made the manufacture of mince meat his hobby ever since.

Gradually other lines were added such as pie fillings, preserves, marmalades, fruits and syrups for soda fountains and bakers' supplies.

The sales are principally in New England and the states along the Atlantic seaboard. The company employs fifty operatives and has capital of $125,000. L. E. Whipple is president, and F. G. Bailey, is secretary and treasurer.

THE NATICK BOX AND BOARD COMPANY

In 1896, C. A. Coombs, of Natick and Charles J. Sawyer, of Hudson formed the Natick Box and Board Company which today employs 150 in the manufacture of paper boxes and boards, the original partners still being active in the concern.

The business had been started on a small scale, in Hudson, in 1890. The concern erected a board mill on land adjoining its Natick factory, in 1914, and about 75% of the entire output of this unit is used by it in the manufacture of folding boxes.

The plant is favorably located on the main line of the Boston and Albany Railroad, and is within easy trucking distance of Boston, Worcester, Fall River, New Bedford, Providence and other New England points.

In the beginning the firm made "quality" its watchword and it has followed that policy for nearly forty years. Proof of its efficacy is found in the number of old customers whose names appear on the books year after year, some of them dating back to the year when the firm was established.

The great advantage of having its own board mill operated in connection with a box factory equipped with up-to-date machinery for making various kinds of folding boxes, enables the corporation to give to New England firms prompt delivery on folding boxes of the better quality.

In 1927 the Natick Box and Board Company was incorporated, with capital of $390,000. A Boston office is maintained at 38 Chauncy Street.

C. J. Sawyer is president, M. E. Vaughn, vice president and C. A. Coombs, treasurer and secretary.

AND THE CAT CAME BACK

A few years ago, Dr. E. G. Baum, then and now a practicing surgeon and physician in Natick, had, as a patient, a small child who was troubled with a dangerous eruption of the skin which failed to yield to treatment. Early one morning, while coming to visit his youthful charge, Dr. Baum noticed a cat lapping the milk which had escaped through the ordinary disc in the milk bottle standing on the door step. Sensing the danger, he made arrangements to have the milk placed by the dealer under a box, and within two weeks the skin disease had been cured. This fact brought home to Dr. Baum, who had invented a number of other different articles, the importance of having a type of cover to prevent such an occurrence in the future. That was the beginning of the Sealkap idea which eventuated in a patented milk bottle cover, classified as a cover-all cap in the sense that it covers the entire top of the milk bottle, and prevents the possibility of the contamination of the contents from the time of bottling in the dairy until the last drop has been drained by the housewife.

In 1927 the American Sealkap Corporation was organized, and manufacturing began at Natick. More than one hundred million Sealkaps are now marketed each year.

The importance of the product is recognized by health authorities and it appears to be only a question of time before legislation or public demand will require all milk bottles to be provided with this form of protection.

THE NEW ENGLAND PRESSED STEEL COMPANY

The New England Pressed Steel Company was incorporated in February, 1914, and started operations with six stamping presses and two employees. The number has steadily grown until today, about one hundred twenty are employed.

The products manufactured consist of metal stampings made from flat steel to order only.

The concern operates sixty power presses, and a complete spot welding and enameling department, and has a daily capacity of 800,000 pieces of medium-sized stamped or drawn parts for manufacturers.

The company has capital of $114,335, and F. A. Barbour is president, J. H. Parmenter, secretary, and W. H. Townsend, treasurer.

THE GRIESS-PFLEGER TANNING COMPANY

In Natick the critics who are prone to argue that Massachusetts is growing no industries find it difficult to explain away the advent into that town within the past decade of what has become since 1920 the largest plant of its kind in the United States devoted exclusively to the cutting of insoles from flexible splits, and which has turned out since 1924 on an average between 18,000,000 and 20,000,000 pairs of insoles each year.

And they experience more difficulty when asked for the reason for this industrial development, which is that the executives of The Griess-Pfleger Tanning Company, a concern that is the outgrowth of the old partnership of Griess, Pfleger & Company which was founded as long ago as 1878, in Cincinnati, Ohio, by Justin Griess, Julius Pfleger, and Louis R. Hollmeyer, and which is still in existence although a separate unit from the Griess-Pfleger Tanning Company and is now operated by sons and grandsons of

the original partners, found that two factors made it imperative for the concern to locate its cutting factory in the East, far removed from the source of supply, the first of which was that skilled labor was available in Massachusetts, but not in the West, and second, because 60 per cent of the company's product is marketed in the East.

It was not until 1907 that The Griess-Pfleger Tanning Company came into corporate existence, and the main headquarters have always been located in Cincinnati. The company's factories are in Peabody and Natick in this state, and in Chicago and Waukegan, Illinois.

The splits cut at Natick are manufactured at the Waukegan tannery, and shipped to Natick. Starting in the latter town in 1920 in rented space, the demand for the product was so pronounced that in 1923 the company moved into a larger factory, which it purchased.

OTHER NATICK ENTERPRISES

The Acme Handle Company, with capital of $70,000, employs sixty operatives in the manufacture of package handles and paper clips. C. T. Brown is president, H. L. Browne, secretary, and George E. Vaughan, treasurer.

The Ambler Saw Manufacturing Company, owned by John J. Carey, manufactures band saws.

The Ambler Myriagraph Company employs seventy-five operatives in the production of stencil paper and duplicating machinery, and is owned by the estate of James A. Ambler, of which Harry E. Grigor is trustee.

The Avon Manufacturing Company, Inc., of which Victor Avon is president and treasurer, and B. P. Avon is vice president, manufactures leather innersoles, and employ twenty-five operatives. The concern has capital of $25,000.

The Black Diamond Saw & Machine Works employs twenty-five hands in the manufacture of band saws and band-saw machinery, W. B. Ambler being president, G. E. and A. L. Ambler, vice president, and C. A. Ambler, secretary and treasurer, of the corporation.

The Corrugated Paper Mills, with capital of $275,000, employs 125 hands in the manufacture of corrugated paper shipping cases. This is another enterprise of the Kaufman chain, of Framingham, M. B. Kaufman being president, and Aaron L. Strauss, treasurer.

Frank W. Hunt & Company, whose Boston office is at 20-24 East Street, operates its factory in Natick, for the production of oak sole leather cut soles, and employs fifty operatives. The enterprise is owned by Merrill Hunt.

Hygeia Beverages, Inc., of which C. O. Dewey is president, H. P. Delaney, secretary, and C. S. Bicknell, treasurer, has capital of $75,000 and is engaged in the manufacture of bottled beverages.

The J. D. Murphy Shoe Company, a partnership made up of D. J., J. D., F. J., and E. A. Murphy, employs 150 operatives in the manufacture of men's shoes, and has its Boston office at 36 Lincoln Street.

The Natick Tag & Label Corporation, of which A. H. Wechsler is president and treasurer, and Meyer Orlov, secretary, is capitalized for $15,000, and employs thirty hands in the production of paper tags and labels.

Approximately 200 operatives are employed in the Natick factory of the Stern-Made Dress Company, where children's dresses are manufactured. The Boston office is at 786 Washington Street, and the concern has capital of $50,000. Edward T. Stern is president, and Leopold Stern, treasurer.

The Winchell Shoe Manufacturing Company, with capital of $100,000 employs 125 hands in the production of men's and boys' Goodyear welt shoes. It maintains a Boston office, at 113 Lincoln Street. M. L. Whitcomb, Jr., is president, E. J. Dumont, secretary, and J. H. W. Whitcomb, treasurer.

The New England Division of the Container Corporation of America, whose main headquarters are in Chicago, is located in Natick, where corrugated paper shipping cases are produced.

The Kay Parlor Upholstering Company owned by Paul Kay, manufactures parlor furniture, and employs thirty-five operatives.

In 1929, the Starr Shoe Manufacturing Company began the local manufacture of medium grade McKay shoes for distribution to wholesale and chain stores.

NORTH READING

In 1842, Samuel E. and Frederick Abbott formed the shoe manufacturing firm of Abbott Brothers, the former becoming sole proprietor two years later. In 1917 the concern was incorporated as the Abbott Shoe Company with $50,000 capital, with Herbert L. Abbott, son of Samuel E., as secretary, and the plant turns out 1,000 pairs of women's shoes and men's slippers daily. Now almost ninety years old it ranks as one of the oldest continuous industrial enterprises of Middlesex County, and employs 150 operatives. George L. Wehrle is president, Herbert L. Abbott, son of one of the founders, secretary, and Marc S. Wright, treasurer.

PEPPERELL

In 1817, Joseph Buck began the manufacture of carriages, in Pepperell, and later cutlery, leather and cotton and woolen goods, were manufactured in the town.

As early as 1824 boot and shoe making was begun.

In 1834 a paper mill was built at Babbitasset Falls, a water power that had been used at intervals even before 1730. Many changes of ownership followed until the plant ultimately became the property of the Fairchild Paper Company which sold it to the Champion Card & Paper Company, in 1880.

In 1848, Albert Leighton, of Westford, removed to Pepperell, and erected a factory near the depot. His sons succeeded him in 1884, in which year one of the largest shoe shops in Massachusetts, at that period, was erected.

In 1866, a paper mill was built, which was destroyed by fire six years later, then rebuilt, and again destroyed in 1884.

Blake Brothers utilized one of the local mill privileges on the Nashua River, as early as 1835, and manufactured a turbine wheel, invented by one of the members of that family.

In 1889, the Pepperell Card & Paper Company was organized, and today employs upwards of 100 operatives in the manufacture of coated paper, the concern being capitalized for $70,800. Frank P. Carpenter is president, A. B. Carpenter, vice president and treasurer, T. P. Conway, clerk, and J. A. Cashman, assistant treasurer.

John A. Frossard, of Pepperell, is known throughout the paper manufacturing world as the inventor of the device termed the "Doctor," which he evolved as a young man, while employed in a Pepperell paper mill.

Early in the first decade of the present century George T. Keyes purchased the plant formerly occupied by the Fairchild Paper Company and

formed the Nashua River Paper Company, Inc., of which he is president and treasurer. Production has been steadily increased until at the present 170 tons of No. 1 Kraft paper are turned out—making the plant the largest unit for the production of this type in the country. The company operates another plant in Groton.

In 1917, the Pepperell Braiding Company was incorporated, with capital of $49.700 and is equipped with 412 braiders engaged in producing shoe and corset laces and braids. Seventy-five hands are employed. C. A. McGraw is president, E. D. Walker, treasurer, and J. P. McGraw, secretary.

The Cornell Multi-Wall Valve Manufacturing Company has capital of $700,000 and employs fifty hands in manufacturing paper boxes. J. E. Cornell, Sr., is president; J. E. Cornell, Jr., vice president, and H. B. Lanum, treasurer.

READING

The advent of the railroad into Reading gave her citizens a genuine impetus to manufacturing. Mills, both saw and grist, were the first local industries, followed by cabinet and furniture manufacturing plants, Ambrose Kingman being the local pioneer in these fields, and next came boots and shoes, Joseph Bancroft operating a shoe shop as early as 1758, which was continued by descendants for a century and a half thereafter. In 1812, Nathan Weston began the manufacture of hats, and is credited with being the inventor and maker of the first silk hat in America. About 1832, Messrs. Frost & Pratt started the local production of clocks.

In 1847, Samuel Pierce began the production of organ pipes, the concern becoming incorporated as Samuel Pierce, Inc., in 1897. Three years later William S. Dennison became its manager. In 1917 he was made treasurer and manager and in September, 1924, the concern was incorporated as the Dennison Organ Pipe Company, with capital of $50,000. The following year it erected a new building which afforded double the manufacturing space formerly occupied. Sixty employees are engaged in producing wood and metal organ stops, D. Francis Dennison being president, William S. Dennison, treasurer, and Arthur W. Coolidge, secretary.

When J. S. Temple, the founder of the J. S. Temple Company died in 1913, the manager of the business at that time, Phineas A. Hodgdon became vice president of the corporation with which he had been identified since 1884. The company employs forty operatives in the manufacture of neckties, and the officers are Max L. Talbot, president; P. A. Hodgdon, vice president, M. B. Hartshorn, treasurer, and H. L. Platts, secretary. The corporation has capital of $40,000.

The Akerley Manufacturing Company is the successor of the Metallic hair brush industry founded by K. H. Howard and his associates. A. M. Burchart is president, and O. L. Akerley, treasurer and secretary of the corporation, which employs twenty operatives.

In 1895, the operations of Otis P. Symonds & Sons, Inc., which had been carried on for many years in North Reading were transferred to Reading, the plant located on a water privilege that is probably as historic as any in Massachusetts, dating back to the first grant made by the King of England, when the original privilege was permitted to operate for six months, from October to April.

In 1907 the Symonds plant was burned, but was promptly rebuilt. The corporation has capital of $30,000 and manufactures wooden boxes.

Hazen K. Symonds is president, Warren H. Symonds, secretary and Burton K. Symonds, treasurer.

Sanford Mills, "L" a subsidiary of the Sanford Mills, of Sanford, Maine, manufactures artificial leather, in Reading, employing 125 operatives. The commodity enters largely into automobile upholstery. This successful corporation which produces Velmo automobile fabrics and furniture upholstery, car plushes, robes and robe linings, as well as artificial leather, constitutes another example of a New England textile enterprise that finds it possible to prosper by keeping step with the march of style requirements.

L. B. Goodall is president, E. E. Hussey, vice president, and Frank B. Hopewell, treasurer, of Sanford Mills, "L".

THE GLOBE TECHNOLIAN CORPORATION

In 1906 there was established, as a department of the Globe Optical Company of Boston, what today is internationally known as the Globe Technolian Corporation, originally incorporated as the Globe Earphone Company.

It maintains branch sales offices in Boston, Chicago, San Francisco, New York, St. Louis, Philadelphia, Los Angeles, and London.

The first product—the earphone was evolved after twenty years of research and experience in serving those suffering from sub-normal hearing, and for twenty years the Reading enterprise has led in all patented improvements in hearing aids, a fact frequently commented upon in medical and technical magazines, such as *Popular Mechanics*, the *Electrical World*, and *The Albion Magazine*, published in England, in the interests of the deaf.

The high standard maintained by the company's earphones and other hearing aids, has been recognized by three international expositions where it received gold medals.

Before the World War a great many hearing aids, both electrical and mechanical were manufactured in Germany and sold all over the world. These have been off the market for some years, and there has been an increasing demand for American-made goods from all parts of the world, with the result that the Globe corporation has shipped its products to nearly every civilized country and is constantly developing the export field. The company is the owner of many patents, a considerable number covering the inventions of its employees. The corporation officials consider the experimental department one of the most important units of the business as it has evolved most of the improvements which have made its products practical and efficient and has won the highest endorsements—not only from users but from the medical profession and the scientific world.

Perhaps the company's best known product is the lorgnette phone, a unique instrument for very deaf users. The rheostat sound regulator, patented in 1912, marked an epoch in this line, representing as it did the first successful solution of the problem of regulating the volume of sound in an ear phone in much the same manner as one focuses a field glass for varying distances. The flashlight adapter, the desk ear-phone, the church ear-phone, which the company has installed in more than one thousand churches, halls and theatres, and the secret phone, which is used by the U. S. Department of Justice, and in foreign government bureaus, as well as by all the great detective agencies of the world, are included in the line of products.

The company's contribution to the World War was the geophone, an instrument designed by its research department for use by the allied armies in detecting the operations of sappers, and has been termed the stethoscope of the earth. Its peace time uses are as numerous and important as its war work. As a sound detector, it not only locates the noise, but it enables the listener to instantly define the sound, and in mine rescue work, in warning of fires in mines, in determining the point of meeting of two headways in metal mining, and in locating leaks in water mains and service pipes, the geophone has proved its worth.

The latest development is the Globe vactuphone, the only hearing aid which incorporates radio principles, and the only portable earphone in which the amplifying vacuum tube can be used. The company manufactures the vactuphone under the patents of Earl C. Hanson and under a licensing agreement with the Western Electric Company, Inc. The Globe Technolian Corporation has capital of $250,000 and W. C. Mooney is president and treasurer, and Irving Kimball, vice president. Fifty hands are employed at the Reading plant.

Reading's largest industry is the Reading Rubber Manufacturing Company, which is capitalized for $750,000 and employs 175 operatives, in the manufacture of rubberized auto top material and raincoat fabrics.

The company maintains its Boston office at 89 Franklin Street. Frederick C. Hopewell is president, James Clemens, treasurer, and John P. Hach, assistant treasurer, and they, with Frank B. Hopewell, William P. Underhill, and O. F. Kendall, constitute the board of directors.

The Boston Stove Foundry Company, with capital of $82,250, manufactures stoves, Joseph Lanes being president, and M. A. Kaufman, treasurer of the corporation. Sixty hands are employed.

The Bangs Fixture Company, whose main headquarters are at 41 Arctic Street, Worcester, and whose Boston office is at 247 State Street, manufactures drug store fixtures, in its Reading factory, and employs sixty operatives. H. D. Brewer is president and treasurer.

Frederick I. White carries on the business of building and voicing organs.

The Ace Art Company, managed by Lester S. Riley, is engaged in the manufacture of photograph mounting corners and employs twenty operatives.

THE INDUSTRIES OF SHIRLEY

Paper-making was begun in Shirley, by Jonas and Thomas Parker, late in the eighteenth century.

In 1812 the Munson Yarn Mill was built by a group of citizens living in the adjoining town of Harvard, and later the Fort Pond Mill, which ultimately combined with the Shirley Cotton Mill, was erected. Then followed the Lake Mill, and the Munson, or New Mill.

In 1832, the Fredonia Mills were built, and during the Civil War operated 3,280 spindles and sixty-eight looms, and engaged sixty operatives, in the manufacture of light brown sheetings. In 1884 the Fredonia Mills were acquired by C. W. and J. E. Smith.

The Edgarton Company erected the town's second paper mill, locating it on the Nashua River, and in 1833 installing a "fire dryer," the invention of H. P. Howe, which greatly reduced the time and labor required by the air-drying methods then in use. The plant was built in 1837, but was rebuilt on a larger scale by Eli Page.

In 1849, the Shaker Community erected the Phoenix Mills, which were

equipped with 11,376 twist, ring and mule spindles, and 130 looms, and employed 100 operatives.

In 1868 B. S. Binney erected a mill where he produced asbestos paper.

THE PRESIDENT SUSPENDER COMPANY

In 1872 Charles A. Edgarton & Company began the manufacture of tape by machinery that had been but recently patented, and the production of suspender webbing and elastic goods was added. Six years later new and improved machinery was evolved, and in 1881 a new factory, two stories high, 80 by 28 feet was built, fifty operatives being carried on the rolls at that time.

In 1892 the concern was incorporated as the President Suspender Company, which today has capital of $478,200, and employs 300 hands in the manufacture of suspenders and garters.

Mr. Edgarton was a firm believer in national advertising and launched a consistent and continuing billboard and magazine campaign which within a few years made the President suspender an internationally known commodity.

Arthur C. Wise is president, Walter E. Piper, treasurer, Elmer H. Allen, assistant treasurer, and Asa F. Clark, clerk of the corporation.

In 1888, the Samson Cordage Works bought the Phoenix Mills, which the Shaker Community had erected in 1849, and began the manufacture of braided cord and cotton twine.

Today, the concern employs 500 operatives there and at its Boston office, at 88 Broad Street.

H. G. Pratt is president and treasurer, E. S. Pratt, vice president, W. R. Dewey, Jr., assistant treasurer, and F. J. Coakley, secretary.

The complete story of this unit is carried in the chapter devoted to the industries of Suffolk County.

STONEHAM

Stoneham's industries have grown from the original saw and grist mills established in the first decade of the eighteenth century, but up to less than a hundred years ago the town remained a farming community, having but 900 inhabitants, in 1837.

By 1840 small factories began to appear, the William Tidd tannery being established at about that period. The Civil War demand for shoes stimulated local capital to engage in the production of footwear, which industry continues there today.

HARVESTING VITAMINES OUT OF THE CODFISH

There are those who delight in publicly asserting that the citizens of the Bay State have not had a new idea since the early colonists pulled from the waters of Massachusetts Bay the first codfish and translated it into an article of commerce, but the statement is wide of the mark as is evidenced by the stellar contribution given to science and industry by the E. L. Patch Company, of Stoneham, which in 1921, after thirty-five years' work as pharmaceutical manufacturers, turned its attention to the study of vitamins as a part of the specialization program which has proved such an important factor in the development of the concern.

Placing one of the country's foremost authorities on vitamins in charge of the problem, the discovery was made that while cod liver oil had been generally employed for its medicinal value for two and a half centuries, not until modern research in the company's laboratories revealed the



PLANT IN WHICH THE E. L. PATCH COMPANY
BEGAN BUSINESS IN STONEHAM IN 1889



THE E. L. PATCH COMPANY, STONEHAM, 1928

commodity as being the richest known source of vitamin A, and the anti-rachitic vitamin, was its therapeutic value understood—another indication of the advance of Massachusetts industry joining with science in evolving the pioneer product and in proving to the medical world that American cod liver oil manufactured under modern scientific conditions is superior to that made in any other country on the globe.

GIVING THE HUMBLE COD ITS RIGHTFUL PLACE IN THE SUN

Before any product was offered on the market more than a year was spent in the company's research department in testing various methods of handling and cooking the cod livers and in storing the oil. As a result, radical improvements in the whole process of manufacturing cod liver oil were made. It was found that an adequate supply of fresh livers was the first essential in producing medicinal cod liver oil of high vitamin potency and agreeable taste. It became necessary for the Patch Company to set up many plants along the shores of Cape Cod and Nova Scotia, and as far north as Newfoundland, where the oil is extracted at once from strictly fresh livers. The company next developed a method whereby the oil can be made on the large trawlers while the boats are fishing far out to sea. Only a few minutes after the fish are hauled aboard they are dressed and the livers go immediately into the cookers where the oil is extracted.

After the manufacturing process was perfected, it was still necessary to carry on work in the research department, as every consignment of oil is biologically assayed on animals at the company's plants in order that the vitamin potency may be guaranteed.

The product soon won professional recognition and today it not only enjoys national distribution, but is marketed in Mexico and all South American countries.

MEETING THE DEMANDS OF THE MEDICAL WORLD

A Massachusetts pharmaceutical house has thus brought New England into her rightful position as a producer of high grade medicinal cod liver oil to fill the great need of the medical profession.

The program for the future development of the Patch Company includes several new products which, when commercially marketable, will take their place along with the other Patch specialties.

The company is typically New England in all its factors, as its founder, Prof. Edgar L. Patch, was a product of old Worcester County, having been born in Spencer, spending his boyhood in Worcester and Clinton, the turning point of his career coming to him while serving as a drug clerk in the latter town. Later he became the real genius of the faculty of the Massachusetts College of Pharmacy in Boston. He located in Stoneham, where he built up the vast business which bears his name, and where he died in 1924. Dr. Arthur D. Holmes, the head of the company's laboratory, is a native of New Hampshire, and a product of Dartmouth College.

PHENOMENAL GROWTH OF THE CONCERN

It was in 1889 that the manufacturing operations of the Canning & Patch drug store were transferred to the old Brush Murphy shoe shop, in Stoneham, and a new company, known as The E. L. Patch Company, was organized.

The business grew rapidly, necessitating an addition to the plant in 1890 which doubled the floor space. Others followed in 1891, 1895 and 1901.

The addition of another wing in 1902 furnished sufficient room for expansion for a period of eight years, but in 1910 the company erected a large concrete plant, and at the same time discontinued handling chemicals and other crude drugs, devoting all its space to manufactured products. Even then more room was needed, and in 1917 another concrete addition was built and the company's offices were moved from Boston to Stoneham, thus increasing efficiency and improving the service.

A specialization program was started and more slow moving items were discontinued. Under this policy the business grew rapidly.

Before the World War most of the company's business was confined to New England. With the coming of peace an expansion program was undertaken, new specialties were created and new territories opened.

In 1927 it was found desirable to erect another substantial addition to the plant. The company is capitalized for $280,000, and employs 175 hands.

Ralph R. Patch is president and treasurer, James A. Patch, vice president, William S. Lister, assistant treasurer, and G. Y. Hutchins, secretary of the corporation.

THE PAPER-MAKERS' CHEMICAL CORPORATION

In 1904, the Vera Chemical Company was established in Stoneham, and a digester of 100 barrels capacity was installed to produce prepared rosin size. The business prospered, and within ten years the concern was marketing its product to a majority of the paper mills in this country. The name, "Vera" was adopted in honor of the daughter of Norbert Becker, a close friend of one of the founders of the Vera Chemical Company of Milwaukee.

Little or nothing is known concerning the introduction of rosin size into America. Probably Joseph Krah, a German paper-maker, was the first to make a practical use of it in the paper mills here. He emigrated to Baltimore, Md., about 1830, where he successfully sized paper in a mill then operating in that city.

His services were sought by paper manufacturers all over the country and finally Mr. Garfield, who operated the "Old Hickory" mill, now the Mountain Paper Company in Lee, secured his services and took the young man into his home to live, keeping the secret and enjoying a monopoly of perfected methods.

In later years Krah made the acquaintance of Levi J. Gleason, who was working at this mill at the age of fifteen. Krah took a liking to the young man and taught him the secrets of the art. Levi, however, was of a roaming disposition, worked in many paper mills and probably did more than any other man to spread the use of rosin as a sizing agent in this country.

In 1927 the production of pulp colors was begun at the Stoneham plant, the water employed in this new process of manufacturing insoluble pigments by the precipitation of chemicals or dyestuffs, being taken from Spot Pond, two miles away from the factory.

The Vera Chemical Company is now one of the units of the Paper-Makers' Chemical Corporation.

JOHN REGNIER & SON COMPANY

In 1927 the business of J. A. & W. Bird Company, a concern that acted as agents for the Casein Company, was taken over by John Regnier & Son Company, of Stoneham, Boston and Buenos Aires. John Regnier spent twenty-five years in coating plants, and twenty-nine years in the casein field, being the leading American pioneer in the latter.

The use of casein in the United States is comparatively recent, but it has been employed in Europe for centuries, although in the earlier periods the curd was mixed directly with the necessary alkalies without first being dried. No one knows exactly when casein was first used, but many articles that have been excavated indicate that the ancient Egyptians used a combination of milk curd and caustic lime for glueing together pieces of wood and for veneering. Roman ruins have also yielded fine examples of furniture which had been glued with casein glue and these pieces have endured through the ages. This quality to retain strength and durability for years and even ages is a typical casein attribute, and no other adhesive is known which possesses this factor.

The Regnier enterprise is now a part of the Paper Makers' Chemical Corporation.

THE J. J. GROVER'S SONS COMPANY

In 1865 the late James Jacobs Grover, who, at the age of sixteen years became a shoe apprentice, in Guysborough, Nova Scotia, hired a small second floor factory in the Jesse Atwill Building, on Monroe Street, in Lynn, and became a full-fledged manufacturer of women's shoes.

Mr. Grover had carried on business as a custom boot maker, in Guysborough, beginning in 1846, but five years later he determined that greater opportunities awaited him in the United States, and he came to Portland, Maine, where he remained a few months, removing to Lynn, then the foremost shoe town in this country, and began making and heeling hand-sewn shoes for Stephen Oliver, Jr.

Strong and active, both mentally and physically, he soon was regarded as one of the most skillful and fast working shoemakers of his day, and his tireless energy and frugality enabled him to accumulate a little capital by making fine serge shoes on his own account, for Boston retailers. In 1865 he hired a small second floor factory in the Jesse Atwill Building, and became a manufacturer of women's shoes. S. Oliver, Jr., became his partner. Later the business was moved to large quarters, where Henry French and George D. Whittle formed the firm of French, Grover & Company, which was succeeded by J. J. Grover alone, with Mr. Whittle as a special partner. The founder adopted as his trade-mark, "Soft shoes for tender feet," and, in 1871, Simon Brown became a special partner with Mr. Grover, but soon afterward withdrew, and the founder remained sole proprietor until his death in 1883, when the business was continued by his widow and his oldest son, Charles S. On April 1, 1893, James H. and Lyndon V. Grover, sons of the founder, were admitted to the firm, which continued without change in personnel until its incorporation on July 1, 1918, with paid-in capital of $800,000.

On the death of Charles S. Grover on April 4, 1919, James H. Grover became president, Lyndon V. Grover, treasurer, and Ernest W. Grover, a son of Charles S., clerk, and the personnel remains unchanged today.

A gradual development and expansion of the business necessitated a removal in 1890 from the Monroe Street, Lynn, factory, to 216 Market

Street, and six years later to the Hemingway Building. In 1903 the seven-story Barnard Building was occupied, where ultimately, 104,000 square feet of floor space were utilized.

Nine years later it was deemed wise to purchase a large plant in Stoneham, which was operated as a branch of the Lynn establishment, until 1926, in which year in the interest of economy and efficiency of operation, a second building was erected at Stoneham, and the Lynn shop was abandoned, the concern having carried on business there for sixty-one years.

The J. J. Grover's Sons Company has witnessed a remarkable transformation in the type of women's shoes produced, welted and McKay-sewn footwear having been added to the traditional line of turned shoes, while improved processes of manufacture have been substituted for the primitive handwork of sixty or more years ago. The development of the style element in the industry, which has become all-important during the past decade, has actually modified and supplemented the original line of comfort shoes, and the company today stresses the slogan, "Grover fashion shoes make fashion comfortable." The product is marketed through retail stores in all parts of the United States, and to a limited extent in Great Britain and Australia. The corporation has capital of $460,000 and employs 300 operatives.

OTHER INDUSTRIES OF THE TOWN

The Publix Shoe Corporation, formed in 1928, is now occupying the Cogan factory, and is manufacturing novelty McKay shoes.

The Crystal Shade & Screen Company is engaged in the manufacture of window shades and screens.

The Bosworth Mills, Inc., with capital of $50,000, operates a plant in Stoneham, as well as one in Melrose, in the production of wash dresses, employing seventy-five operatives. Roy L. Bosworth is president and treasurer.

The Durkee Shoe Company, whose Boston office is at 10 High Street, manufactures boys' shoes in its Stoneham factory.

Warren H. Longmore is engaged in producing cutting dies.

The Bay State Box Company has capital of $150,000 and employs sixty hands in the manufacture of paper boxes.

R. B. Anderson is president and E. A. Anderson, secretary and treasurer.

The O. H. Marston Company, owned by Arthur L. Souther, manufactures seidlitz powders and druggists' powder papers.

One of the Massachusetts plants of the American Glue Company is located in Stoneham.

Harney Shoes, Inc., employs 200 operatives in the manufacture of women's footwear. Patrick J. Harney is president, Arthur P. Harney, secretary and Charles F. Harney, treasurer.

One of the factories of Scott & Co., Ltd., is located in Stoneham.

STOW

The Rock Bottom Manufacturing Company, located in the village of Gleasondale, in the town of Stow, which was engaged in producing cotton and woolen fabrics, failed in 1829, and the plant was sold to Benjamin Poor, who built a new dam, and installed new machinery in the factory. Incorporated as the Rock Bottom Company in 1835 it prospered until 1849 when it again failed. Benjamin Gleason and Samuel J. Dale bought the property, and engaged in the manufacture of wool flannels, and in

1849 Alfred D. Gleason reorganized the Rock Bottom Company and operated the plant, which in after years was conducted under the name of B. W. Gleason & Sons, and C. W. & A. D. Gleason. It is now known as The Gleasondale Woolen Mills, Inc. In 1901 and 1902 extensive additions were made to the plant, which employs 175 operatives in the manufacture of men's and women's woolen suitings. The company was incorporated with capital of $450,000, in 1915, and the plant is now equipped with six sets of cards, 2,880 worsted spindles, sixty-three looms, complete dyeing and finishing departments, two boilers, and one water wheel.

Nathaniel Stevens is president, and Moses L. Stevens, secretary, of the corporation.

In 1850, Peter Fletcher and Nehemiah A. Kimball removed to Stow, from Ashburnham, and established a tannery, their plant having been burned in the latter town. Prior to 1853, Rufus Temple, Cyrus Brigham and Theodore Pomeroy began shoe manufacturing at Rock Bottom, in Stow.

SUDBURY

About 1880 C. O. Parmenter acquired an old plant, at South Sudbury, and used it as a grist mill. Following his death, the C. O. Parmenter Company was formed, and the mill was employed as a wood-working plant until its destruction by fire several years ago.

Following that event, Henry Ford, of Detroit, Michigan, announced his intention to erect a modern industrial plant on the site, and to engage in a small way in the production of motor car parts. At the time of his original decision the title to the eight acres of land and to the Parmenter Mill pond was involved, and not until December 3, 1928, was this litigation ironed out by the Middlesex County Land Court. The decision was favorable to Mr. Ford, every outstanding claim against the property being cleared to the satisfaction of the court, and a legal transfer of the realty to Mr. Ford followed.

The plans of the Detroit magnate call for a new dam, which will enlarge the area of the old mill pond, and provide a community bathing pool, to be surrounded by a boulevard, and landscape gardening effects. In addition to an attractive manufacturing plant, Mr. Ford intends to create an industrial village and to employ in so far as possible only residents of Sudbury in the production of automobile parts.

TOWNSEND

The early saw and grist mills which were set up in Townsend between 1733 and 1817 ultimately became cooperage establishments in the middle of the nineteenth century.

Benjamin Peirce probably erected the first local tannery in 1800, and Curtis Stevens, Timothy Fessenden, John J. North and John Orr were among those who followed him in the business.

In 1833, Abraham French erected a morocco factory, which was successfully operated for twenty years.

THE FESSENDEN COMPANIES, INC.

A few years after the birth of the American republic Benjamin Fessenden began the manufacture of barrels in Townsend, which he delivered by ox-team in Boston.

In 1864 his son, Benjamin, and Arthur D. Fessenden, son of the latter, formed the firm of B. & A. D. Fessenden and engaged in the cooperage

business in Townsend, and the concern growing apace established branch plants under the name of Fessenden & Lowell, at Reed's Ferry, N. H., in 1873; under the name of Kilbourn & Company, at Sandusky, Ohio, in 1879; as Silas Kilbourn & Company at Grand Haven, Mich., in 1884; as Annis & Company, at Londonderry, N. H., in 1886; and as Kilbourn & Company at San Francisco, Calif., in 1887.

In 1904 Robert G. Fessenden became president of the corporation formed at that time, and since 1916 has been treasurer and general manager of the concern. W. F. Rockwood is president, and T. J. Harvey, secretary. The plant, extending for more than a quarter of a mile along the main automobile highway, has been thoroughly modernized and enlarged within recent years, and the company is one of the most successful concerns of its kind in the country.

On November 30, 1925, the various interests were consolidated into one organization, under the name of The Fessenden Companies, Inc., with headquarters at Townsend. The growth of the new concern has been marked, and improved manufacturing methods have paralleled its success. Among the first to install machine operations, the company's executives conducted experiments and eliminated the faulty methods of heating, by burning and crocking over an open fire. Barrels and kegs are now conveyed through a 200-foot tunnel, in which air heated to a high temperature, bends and sets the staves. This system, the first of its type built in the United States, eliminates the human element, and produces a clean and sanitary barrel, besides minimizing shrinkage, and really constitutes a milestone in the path of progress. Kegs and barrels are produced at the Townsend plant from 2½ to 57 gallons capacity. Pails and fishing kits are also produced.

Tonguing and grooving the staves has been adopted in recent years, thus giving the products greater strength, minimizing leakage, and improving the appearance of the kegs.

The fifth generation of the Fessenden family is now active in the management of this long-established concern, which employs 325 operatives and has capital of $1,328,754.

GOVERNORS ARE INCLUDED IN THE SPAULDING PRODUCTS

Prominent as Massachusetts manufacturers have been in the political life of the Commonwealth, many of them having served as Governors, Lieutenant Governors, Representatives in Congress, and in state legislative halls, it is doubtful if any other Bay State industrial concern can claim having had two of its corporate executives chosen as Governors of a state as is the case of the Spaulding Fibre Company, Inc., successors to J. Spaulding & Sons Company, Inc., with plants at Townsend Harbor, in this state, and at North Rochester, Rochester, and Milton, N. H., Tonawanda, N. Y., London, England and Paris, France.

In 1915-16 Hon. Rolland H. Spaulding was Governor of New Hampshire, and Hon. Huntley N. Spaulding preceded the present Governor as the Chief Executive of the Granite State. The Townsend Harbor plant is the first in which the Spaulding family began business, nearly three-quarters of a century ago, when Jonas Spaulding began the manufacture of heeling board there, a commodity which, at that period, was extensively used for heels in the manufacture of shoes.

About forty years ago, Jonas Spaulding turned the management of the business over to his three sons—Leon C., Huntley N. and Rolland H., and the concern has been uniformly successful over this long period of

years. The plant has a capacity of six tons of heeling board a day and it has been in continuous operation ever since the Spaulding brothers assumed its management. Due to changes in the shoe industry, heeling board is not sold in as great quantities as was the case a few years ago, but notwithstanding the fact that other products have been found for making heels, a good business has been built up, and today the heeling board is sold all over the world. The Townsend Harbor unit stands as the original plant of the Spaulding Fibre Company, Inc., which today is one of the largest of its lines in business.

At the Milton, North Rochester, and Rochester, N. H., plants, twenty tons of fibre board are turned out daily, making the concern the largest manufacturers of the commodity in the United States, and also the biggest in the world in the production of fibre counters, these products being exported to all corners of the globe.

Not content with the manufacture of soft fibre, the three sons built a large plant at Tonawanda, N. Y., for manufacturing vulcanized fibre, and there twenty tons of paper a day is produced, which is used ultimately in the manufacture of vulcanized fibre. Through the medium of its own stores located in seven of the principal cities of the United States, the company markets its products direct to the trade.

Realizing the possibilities of an export business, the three brothers own large interests in factories located in Paris and London and carry on an international business.

The company has always been owned by the Spaulding family, the three brothers first operating under a partnership and later as a corporation.

The Spaulding Fibre Company has capital of $3,000,000 and in all its plants employs 600 operatives. Former Gov. Rolland H. Spaulding is president, Former Gov. Huntley N. Spaulding, treasurer, and C. M. Pilse, secretary of the corporation.

The Homer Oil Burning Corporation, with capital of $35,000, employs twenty operatives in the manufacture of oil burners. The concern is now a subsidiary of the National Fireworks Distributing Company. L. C. Beaway is the general manager of the Townsend plant.

The Duncan Rusk Corporation, located at West Townsend, is engaged in quarrying the famous West Townsend granite, regarded by many architects and engineers to be unsurpassed in beauty, and which is used for buildings, memorials and general construction. The corporation has capital of $150,000 and employs seventy-five operatives. Duncan Rusk is president, Ian M. Rusk, treasurer, and Dexter B. Pattison, secretary.

WAKEFIELD'S EARLY INDUSTRIES

Jonas Eaton was Wakefield's first shoemaker, and in 1805, Capt. Thomas Emerson erected what in later years became the largest shoe factory in the town.

Next followed L. P. Evans' Sons, now capitalized for $300,000, and employing 200 operatives, in the manufacture of slippers and shoes, Percival B. Evans being president, E. G. Austin, secretary, and A. L. Evans, treasurer, of the concern, which maintains a Boston office at 110 Summer Street.

In 1856, Cyrus Wakefield, Sr., began the manufacture of reeds used in hoop-skirts, later turning his attention to the making of chair seats and rattan furniture, importing his raw material from India. Prior to his death, in 1873, he formed the Wakefield Rattan Company. Eight years

later the main factory of the concern was destroyed by fire, but was rebuilt on a larger scale, and is now the local plant of the Heywood-Wakefield Company, whose history is treated in the story of the industries of the city of Gardner, where the main unit is located.

In 1882 the Jordan-Wakefield Company was formed to manufacture reed furniture.

The Boston & Maine Foundry, founded in 1854, by Blanchard Tarbell & Company was an important addition to local enterprises, and in 1879, was sold to the Smith & Anthony Stove Company and later the plant became the Gibby Foundry Company.

Henry F. Miller established the Henry F. Miller Piano Company, in 1863, making a specialty of grand pianos, and, in 1882, all the manufacturing of the concern was concentrated in Wakefield. The local unit is now known as the Henry F. Miller & Sons Piano Company division of The Continental Piano Company, a $2,500,000 corporation. The history of the corporation appears in the chapter devoted to industries of Suffolk County.

WINSHIP-BOIT & COMPANY

In 1889 there removed to the town from Cambridgeport what was destined to become the largest local industry—the Harvard Knitting Mills, which was started in a small way on the third floor of the Wakefield Block, by Charles N. Winship and Miss Elizabeth Eaton Boit, who, today, hold the positions of president and treasurer, respectively, of Winship, Boit & Company. They began business in Cambridgeport, with three knitting and five finishing machines, and a daily production of fifteen dozen pairs of men's hosiery, later developing the manufacture of women's underwear. Upon removal to Wakefield, twenty-eight girls were employed, and the total annual sales value at that period did not exceed $20,000 a year.

In 1896, the first unit of the present mill was erected, with a floor space of about an acre, in which ninety-two knitting machines and eighty sewing machines were installed, affording a daily capacity of 300 dozen. Since then additions and increased equipment, including bleaching and dyeing departments, have been made until by 1923 the company was utilizing eight and a half acres of floor space, and was operating upwards of 500 knitting machines and 500 sewing machines, having a daily capacity of 2,000 dozen garments a day, employing at that time about 600 hands.

The sales department is housed in a building apart from the factory, containing three stories and a basement.

Early establishing a bonus system, this policy did not fully satisfy the partners, and in 1920, they launched their unique "fifty-fifty" profit-sharing plan, different in its operation from anything then in vogue.

Today, the plant is equipped with 600 knitting and 600 sewing machines, and four boilers, employs 600 operatives, and produces the famous "Merode" and "Harvard" brands of knit fabrics, men's, women's and children's cotton, woolen, worsted, merino, lisle, silk and rayon, fleece lined ribbed underwear, and union suits.

The concern is still owned and managed by the original partners—C. N. Winship and Elizabeth Eaton Boit.

In 1912, the Middlesex Knitting Company was incorporated, with capital of $100,000, to manufacture sweater coats, bathing suits, sport coats, and jerseys, and now employs upwards of 100 operatives. R. E. Fairbanks

is president, and A. H. Fairbanks, treasurer and secretary. The present capital consists of $50,000 common and $9,500 preferred stock.

THE NEVEROIL BEARING COMPANY

Wakefield is also the home of a somewhat unique industry—the Neveroil Bearing Company, engaged in the manufacture of a complete line of self-lubricating bearings, and the successor of the Massachusetts Oilless Bearings Company, which had its original factory in Worcester, until 1922, when the plant was removed to Wakefield, at which time the corporate name was changed.

The original products were impregnated wood bearings, fabricated from the finest rock maple, into which was forced at least 50 per cent of lubrication. The executives of the concern, most of them technically trained college men, realized that different types of lubricants were required for varied installations, and after years of experimental and research work formulae were developed for different requirements. Today, the bearings are extensively used in all types of textile machinery, packaging, paper-folding and paper-box machines, vacuum cleaners, light counter shafts, and in fact wherever a bearing is difficult to reach, or where the presence of free oil is objectionable. Some of the company's customers use 100,000 bearings each month. About a dozen years ago the concern acquired the patents on a metallic oilless bearing that would withstand heavy loads and operate under water, and this type, fabricated by using special alloys and fine flake graphite, is marketed under the name of "Graphex," being largely used by all types of pump, automatic mailing machine, cigarette and cigar making, printing press and bleaching and textile machinery producers and users.

The company's latest development is an oilless bearing that will withstand temperatures up to 800 degrees Fahrenheit, these being used in the glass industry and by producers of felt hats where oil is objectionable in the manufacturing processes and is also subject to water and steam.

The wood department of the concern does considerable custom work in untreated wood turnings, requiring accuracy and precision.

In December, 1927, the company purchased the Federal Metallic Packing Company, of Boston, and removed the plant to Wakefield, the following year. The Federal unit previously had been engaged in producing high grade metallic and semi-metallic packings for air, water, steam or ammonia purposes for a quarter of a century.

The Neveroil Company ships its products to all parts of the United States and to Europe.

Malcolm Green is president, James H. Elliott, treasurer, and Robert H. Osborn, vice president and general manager.

The Federal Metallic Packing Company is one of the town's newer and growing industries, and manufactures metallic packing consisting of a series of V-shaped composition metal strands twisted about an asbestos filler, flax or cotton, thus producing wearing surface that is always of metal. The product, although semi-metallic, is flexible and highly compressible, the concave and convex forms of the made-to-order rings adding to this compressible factor. The company also produces shredded metallic packing of an all metal type manufactured in long skeins which are thoroughly lubricated, and used in all kinds of stationary valves, along pipe lines, over boilers, and wherever a small type of packing is required. It has a fusing point of 650 degrees Fahrenheit. Fibre pump valves, practically indestructible and flexible when placed in water, are also pro-

duced, together with metallic ring packing for use on air and ammonia compressors, valve stems, and centrifugal pumps.

Malcolm Green is president and C. King, treasurer, of the corporation.

The Wakefield Garage Manufacturing Company has enjoyed a consistent and steady growth within recent years.

The exclusive use by the company of "Toncan" metal throughout in the manufacture of the garages produced by it has been a big factor in the increase in sales. This type of construction is not only applied by the concern to garages, but also to wayside stores, caddy houses, foundries, workhouses, school buildings, cottages, playhouses and bungalows.

In 1924, the Fenway Knitting Mills were incorporated, as a subsidiary of the Middlesex Company, and now employ fifty operatives in the manufacture of worsted and fibre silk golf vests, sweater coats, golf and sport hose, and light-weight knitted fabrics.

The American Reed & Fibre Furniture Company, with capital of $125,000, employs upwards of seventy-five operatives in the manufacture of reed and willow furniture, and has its Boston office at 368 Congress Street. D. C. Pierce is president, and F. J. Foley, secretary and treasurer.

The Industrial Chemical Company, owned by A. K. Comins, produces tanners' materials.

The Lead-Lined Iron Pipe Company employs fifty hands in the production of lead and tin-lined iron pipe, and has capital of $250,000. Thomas E. Dwyer is president, John D. Dwyer, secretary, and Dennis F. Dwyer, treasurer.

The Morrison Skinner Company has capital of $28,750 and employs fifty operatives in producing window screens. Elmer E. Morrison is president and Frank E. Morrison, secretary and treasurer.

The Oxidite Manufacturing Company, Inc., with capital of $25,000, is engaged in the manufacture of paints. W. F. Brown is president, W. E. Ludden, secretary, and C. F. Brown, treasurer.

One of the Massachusetts plants of the A. G. Spalding & Bros. of Chicopee and New York, is located in Wakefield, where upwards of 100 operatives are employed.

The Steel Specialties Company, with capital of $50,000, produces nut locks and weather strips. A. W. Clark is president and John Wylie is secretary and treasurer of the corporation.

The Wakefield Paper Box Company, with capital of $40,000, employs 100 operatives in the manufacture of paper boxes. Clarence T. Hamill is president, Augustus C. Wiswall, treasurer, and C. A. Wiswall, assistant treasurer.

The Wakefield Machine Company, owned by Perry A. Davidson, employs ten operatives in the manufacture of special machinery.

The Vincent Window Frame Company, of which A. J. Vincent is president and A. C. Beemer, treasurer, employs fifteen hands in the production of window frames.

This concern began manufacturing operations in 1928, but it has added two substantial buildings to its plant within the period of a year.

THE VARIED INDUSTRIES OF WATERTOWN

The industrial history of Watertown runs back almost three hundred years.

Following the fulling mill experiment at Rowley, the next enterprise of that type established in the Massachusetts Bay Colony was fostered by

Thomas Agar, a fuller, residing in Roxbury, who, in May, 1662, purchased of Timothy Hawkins three-fourths of an acre of land and erected a fulling mill in Watertown. In December of the following year he sold the mill and land to Thomas Leveran, a cloth-worker from Dedham, England. It was the second mill in Watertown, and in 1669-70 was conveyed to Hawkins, the original owner of the land, and Benjamin Garfield. Another fulling mill was built in the town on Mill Brook, adjoining the first water-mill which had been erected about thirty-five years before by Edward How and Mr. Cradock, and which was later owned by How, Thomas Danforth, and others, who built their fulling mill previous to November, 1686.

The factory production of woolen cloth was begun in Watertown about 1787, and just prior to the establishment of what is often referred to as the initial New England experiment along this line—that inaugurated by the Hartford Manufacturing Company of Hartford, which began in 1788, but which failed soon after. The Watertown factory operated only about a year on woolen fabrics, when it changed to cotton warp production.

The manufacturing enterprises of Seth Bemis, of Watertown, which were of large extent for the period during which they were carried on, are treated at length in the chapter of this work devoted to the early textile operations in Massachusetts.

Watertown appears to have been a center for industrial bootleggers during the early years of the nineteenth century.

The first stocking machine which came to New England from the mother country, was smuggled into the United States, from Liverpool, in 1818, and was set up in Watertown, at a spot near the plant of the present-day Aetna Mills. Unfortunately, a part of the machine had been left behind and considerable delay was occasioned in operating it until new parts could be made.

For two years or thereabouts it was operated at Watertown, and in 1822, its owners, Benjamin Fewkes and George Warner, removed it to Ipswich.

In 1820 a lace factory was established in Watertown, near the Newton boundary line, being equipped with machines that had been surreptitiously brought into the country, concealed in the personal effects of workmen who had been employed in Heathcoat's factories, in England, the bulky parts and framework being fabricated here from drawings brought over by skilled machinists.

In 1824 the Watertown machines were moved to Ipswich, where they were operated by the Boston and Ipswich Lace Company. Four years later, a rival concern, sponsored by Dr. Thomas Manning, and others, and known as the New England Lace Company, was established. It continued operations until 1832 when the difficulties attending securing a sufficient supply of thread of fine enough texture to manufacture lace, brought about a cessation of production. The British government, finding that machines and workmen were engaged in making lace here, placed a prohibitive export duty on thread and permitted the free exportation of lace from England to the United States.

The Boston and Ipswich Lace Company closed its doors as early as 1827.

Mason Hunting, of Watertown, was granted a patent on October 20, 1828, covering an improved top press roller, for making paper of any thickness at one operation.

LEWANDOS FRENCH DYEING AND CLEANING COMPANY

One of the oldest, if not the very oldest, local industrial enterprise, is Lewandos, the original dye-house having been established by A. Lewando, in 1829, and at a period when he lived at the corner of Galen and Pleasant streets, in Watertown. He maintained an office at 18 Essex Street, Boston, which, in 1842, was removed to 9 Court Street, in that city.

About 1864 he transferred the Boston office to 150 Washington Street and 4 Summer Street; and at that period he advertised his French Dye-house and Steam Scouring Establishment, as the only one of its type, and announced that all goods were to be received at the dyeing plant, in Watertown.

The present building stands on the site of the original structure, which is bounded by Pleasant and Galen streets, and the Charles River, and faces Watertown Square.

In the '70s the property was purchased by George S. Harwood and George H. Quincy, the latter retiring some years later. Mr. Harwood incorporated Lewandos French Dyeing and Cleansing Establishment, in 1899, the concern being previously operated as Lewandos French Dye-House.

From the single employee—Mr. Lewando—the concern has grown until today 300 are carried on the payroll, at Watertown, and about 100 in the various receiving offices throughout New England. Many of the dyers have served the concern between thirty-five and forty years, and the average length of employment of all the force is between thirteen and fifteen years.

Many plant additions have been made, and modern and scientific methods introduced. In 1929 there was placed in operation the latest development known to the dry cleaning industry. A new building was erected in 1928, in which were installed a pair of Smith vacuum cleaning machines, together with a filter press and the requisite machinery to operate the devices, and all articles submitted to the dry cleansing process are handled under vacuum, a steady flow of clean gas being admitted at the top of that machine, the gas with the dirt being washed out of the goods drawn off at the bottom, and pumped through the filter at the rate of about 10,000 gallons per hour. The cleaning being under vacuum, admits of much better penetration by the dry-cleaning fluid than under previous methods, and as the fluid is cleaned as fast as it is taken away from the machine, there exists no possibility of distributing soil from one garment to another. The process, known as the Hatfield cyclic process of continuous sterile filtration, is regarded as the last word, and produces results hitherto considered impossible.

Thus, in 1929, Lewandos became the pioneer in introducing the latest known scientific method of dry cleansing, and has carefully preserved A. Lewando's claims of quality service of a hundred years ago.

THE SIMONS-HATCH & WHITTEN SHIRT COMPANY

An important local industry which dates from before the Civil War period is that of shirt manufacturing. Mrs. Silas A. Bates is credited with being the pioneer, followed by C. F. Hathaway, who started his factory, in 1848, which he sold to the Metropolitan Shirt Company about 1865.

After several changes in name the concern became the Simons-Hatch & Whitten Shirt Company, about 1880, and operates under that name today. Upwards of 250 operatives are employed at Watertown, at two auxil-

iary plants, in Boston, and at another in Worcester. The concern is capitalized for $300,000 and William J. Bicknell is president, and George B. May, Jr., treasurer.

THE THOMAS DALBY COMPANY

Watertown possesses an industry whose beginnings were laid in the midland counties of England, where for generations the manufacturing enterprises of the mother country centered about the inventions of the Lee brothers, Jedediah Streett, and Richard and Edmund Cartwright.

In the ancient city of Leicester, England, there was born in 1823, Thomas Dalby, who learned the art of knitting, under the thorough-going apprenticeship system, which has produced so many geniuses. Like many another ambitious and forceful young man, he found conditions in early Victorian England so onerous, and his opportunities so restricted, that he resolved to turn his face westward, to the land of promise and opportunity, and the year he reached his majority, he sailed for New England, with his British bride. Settling at Portsmouth, N. H., he found employment in a primitive knitting mill. Combining thrift with perspicacity, he saved his money and quietly studied American conditions and methods, not only those attending manufacturing, but also those relating to distribution.

In 1852—eight years after his arrival in the United States, he surveyed the opportunities, and decided to build, on the north bank of the Charles River, in Watertown, a small shop, in which he installed knitting machinery, and began the production of men's underwear and women's and children's hosiery. His technical skill and experience, coupled with the insight he had gained into the knitting business in Leicester, England, and at Portsmouth, enabled him to move a few years later into a larger plant, on Bridge Street, where more equipment was placed. Ere long his success was such as to warrant the first units of the present-day factory of the Thomas Dalby Company, on Morse Street. Early in the history of his enterprise he reached the conclusion that specialization of product was the key to continued growth and success, and eliminating the production of men's underwear, he concentrated his manufacture upon fine knit underwear for women, children and infants.

Exactly forty years from the time he established himself in Watertown, the Thomas Dalby Company was incorporated as a Massachusetts corporation, and another factory, originally used for the manufacture of silk thread, was purchased, to supplement the facilities of the Morse Street plant.

THE FIRST KNIT UNDERWEAR CONCERN TO MARKET TO THE RETAILER

The concern was the first producer of fine knit underwear to market its product direct to the retailer, instead of following the then universal custom of selling through jobbers, and never having deviated from this plan, the company prizes its list of customers as a blue book of the best retail stores in the country.

It maintains offices in New York, Chicago, San Francisco, and Los Angeles, from which its salesmen cover practically every town and city in the United States.

In 1898, Thomas A. Dalby became president and treasurer, holding these positions for more than twenty years thereafter, during which period an expansive program was inaugurated and carried into effect, which increased the business more than four fold.

In 1919, when failing health made it imperative for him to give up business cares, his interests were transferred to his nephew, Allan D. Craig, grandson of the founder of the concern, who became president. In July, 1923, Thomas A. Dalby died, in his sixty-eighth year.

The other officers of the corporation are William A. Murphy, vice president, who has been associated with it for nearly ten years, and Lucius W. Grotto, treasurer, who became identified with the concern in 1926.

The concern has capital of $300,000, employs 300 operatives, and its annual sales exceed $1,000,000 a year. The plant is equipped with 150 knitting machines of the most modern type, a complete bleachery and dye-house, and a veritable regiment of sewing machines. Cotton mercerized, cotton merino, pure wool, fibre silk, and spun and floss silk, all enter into the company's products.

The commodities are nationally advertised and embody the ideals of fine material and skilled workmanship that Thomas Dalby acquired in the English midlands, nearly a century ago.

THE AETNA MILLS

The Aetna Mills, located on the site of the grist mill, erected in 1778, by David Bemis, have had a long and interesting history. In 1803, crudely made cotton warp was turned out in the old mill, and later, Seth Bemis, a son of David, made or anticipated many novel improvements along mechanical lines, weaving, in 1807, at the time of the embargo, the first cotton duck ever manufactured in America, in response to a demand from sail-makers who, at that period, could not purchase the commodity, then made in England. As early as 1803, Seth Bemis had begun the spinning of cotton by machinery.

In 1822, he built a "rolling dam" on the Charles River, possibly the first, and surely one of the very few ever constructed. Five years later the Bemis Manufacturing Company was formed, Seth Bemis, and his brother, Luke, owning the greater part of the stock, and the former continued active in the management of the cotton mill until his death in 1849.

In 1862, the property passed to the Aetna Company, and the weaving of woolen fabrics was carried on, the concern having capitalization of $500,000, during the first few years of its career, which later was increased to $1,390,000, the present figures. William H. Claflin, Jr., is president, C. N. Chase, secretary, and D. A. Haig, treasurer. Six hundred hands are employed in producing men's worsted suitings, women's dress-goods and automobile fabrics.

THE WALKER & PRATT MANUFACTURING CO.

In 1877, the Walker & Pratt Manufacturing Company was organized, with capital of $300,000, the concern being an amalgamation of the foundry business established by Miles Pratt, and of a company formed by George W. Walker.

At the outbreak of the Civil War, the Pratt unit was requested by the commandant of the Watertown Arsenal to engage in the making of cannon balls and shells.

The Walker & Pratt Company has pioneered in stove production of various types, manufacturing some of the first that handled coal economically, then turning out a type in which either wood or coal could be burned to advantage, and, in these modern days, providing a type that uses fuel oil of the heavier kinds.

The company has capital and surplus exceeding $1,500,000, and employs upwards of 500 men in its Watertown plant. A. W. Walker is president and R. D. Walker, treasurer.

THE HOOD RUBBER COMPANY—THE WORLD'S LARGEST PLANT ENGAGED IN THE PRODUCTION OF RUBBER AND CANVAS FOOTWEAR

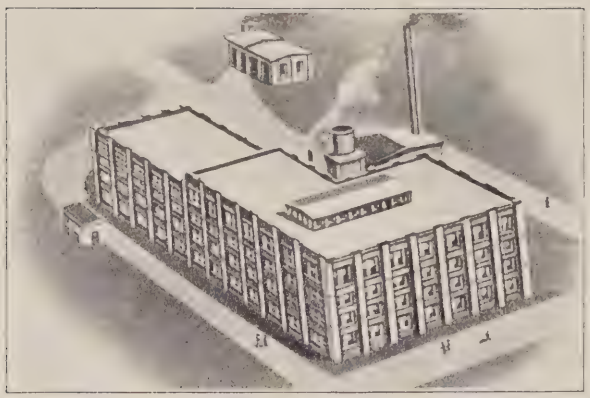
The next time a critical searcher after facts undertakes an economic psychoanalysis of industrial Massachusetts he should turn the pages of history back to the twenty-seventh day of July, 1896, when Frederic C. Hood, then a young man in his early thirties, lifted the first shovelful of earth on the site of the siding, over which the raw materials were to be handled on the fourth day of the following month for the initial structure that was to house the Hood Rubber Company.

The alarmist who gloats over the building of a textile plant in the South is prone to forget that there has grown up in Watertown in three decades a manufacturing concern whose invested capital, whose physical assets, whose raw material requirements, and whose daily production, represent in dollars and cents more money than is invested in the combined units of a given city or town that is commonly regarded as a textile center. For example, Lowell has been known for a century as "The Spindle City," yet the capitalization of the Hood Rubber Company is twice the size of the combined capital of the present-day cotton textile enterprises of Lowell, and even in the years of its below-normal sales of product the Watertown concern outranks by more than $10,000,000 the combined value of the cotton products of the city on the Merrimac, while the 8,500 employees now carried on the payroll of the Hood Rubber Company exceed by nearly two thousand the number of operatives employed in the cotton mills of Lowell.

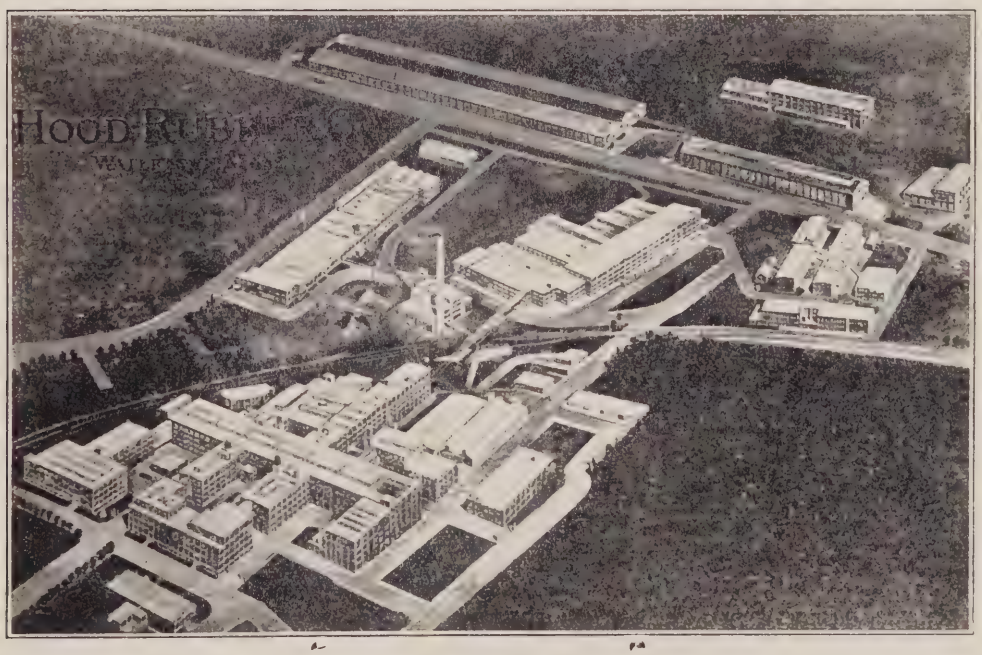
The leading local industry of the city of North Adams is now and has been from the beginning that of cotton textile production, and yet, in 1928, the value of all commodities manufactured in the cotton plants of that municipality was less than twenty-five per cent of the value of the products manufactured at the plant of the Hood Rubber Company, while the employees of North Adams cotton textile plants represented less than a quarter of the total number of operatives at the Hood factory.

In the city of Taunton there are eleven cotton textile enterprises—a total larger than in any other given type of local manufacture—and yet the combined value of their annual production in 1928 was considerably under 20 per cent of that of the Hood Rubber Company in the same year, while they employed in the aggregate less than 20 per cent of the total number of wage earners carried on the payrolls of the Watertown plant.

Standing upon ninety-five acres of land owned or controlled by the Hood concern are upwards of sixty buildings, with a combined floor space of more than forty-five acres, representing an increase in a little over three decades of almost thirty times the factory capacity of the initial structure, which was completed on November 3, 1896—the day William McKinley was chosen President of the United States—and which afforded 67,564 square feet of area. On the seventeenth of the month a small group of workers produced twelve pairs of rubber shoes, and the following day they turned out 216 pairs. By December the output had grown to 3,000 pairs a day, but probably few of the officers or operatives possessed the vision to prophesy that within a quarter of a century the Hood Rubber Company would take its position as the largest single rubber footwear factory in the world, with a daily production capacity of 90,000 pairs of



ORIGINAL PLANT OF THE HOOD RUBBER COMPANY, WATERTOWN, WHERE PRODUCTION BEGAN IN NOVEMBER, 1897



PRESENT PLANT OF THE HOOD RUBBER COMPANY, WATERTOWN

footwear, 3,600 pneumatic tires, 7,000 tubes, 150 solid tires, 50,000 pairs of rubber heels, and 15,000 pairs of rubber soles.

SOME IMPRESSIVE FACTS AND FIGURES

Nor could they conjure up in their most optimistic dreams that the machines at the plant would require a monthly diet of 6,000,000 pounds of compounded rubber, and use 22,000,000 square yards of fabric every year —enough to form a strip a yard wide reaching from the North to the South Pole.

It was impossible for them to foresee the day when the requirements of the plant alone would demand 30,560 tons of coal a year, as they did in 1927—a supply sufficient to meet the needs of a city of 15,000 souls through an average New England winter.

Neither could they visualize at that time the Hood Rubber Company becoming the largest industrial purchaser of electrical power in Massachusetts and maintaining two modern electrical substations which produced in 1927, 46,000,000 kilowatt hours of electricity—enough to supply a city of 200,000 people for an entire year.

They could scarcely picture the passage of 3,500 freight cars that annually move over the railroad sidings adjacent to the company's plants, bringing in the raw materials and carrying away the finished products, nor the fleet of twenty motor trucks supplementing the railroad facilities. Nor could they believe that the sales of the first year of operation, amounting to $412,000, would grow nearly ninety-four times, or to $38,000,000, in 1927-28.

THE WORLD-WIDE DISTRIBUTION OF ITS PRODUCTS

Little did they then believe that within twenty-five years the name Hood would be known in every part of the world, or that Hood products would be exported to eighty-four countries and to 109 geographical divisions of the globe.

The major languages spoken in Hood markets number not less than fifty-three, to say nothing of hundreds of dialects and patois as well.

Every known form of transportation is used in the distribution of the products manufactured at Watertown, to people of many religious beliefs and stages of civilization. Many of the company's direct agents are natives of the countries to which it exports, and in numerous markets Hood has been the pioneer in introducing Massachusetts-made rubber and canvas footwear.

In the Phillippines, and in West India, Central and South American countries the native boys and girls are clad in Hood shoes on their way to and from school; in the mines of South Africa where the floors are usually covered with water the miners use rubber boots made in Watertown equipped with extra heavy outsoles studded with steel; in Palestine Hood products are usually landed at Beyrut, near the Suez Canal, and transported across the desert in automobiles as far as Bagdad, the machines using steel bands for shoes, as no rubber tire has ever been manufactured to withstand the intense heat of the desert, while other shipments from Watertown are made by way of Bombay to Bassa and thence to Palestine by motor or camel caravan; in Colombia the varied topography requires more forms of transportation than anywhere else in the world, and the company's representatives and products are carried into the interior by aeroplanes, railway, automobile, paddle wheel steamboats, mule and ox

teams, aero-cable railways, native tree trunk canoes, and native pack carriers.

Hood tennis shoes are found in most unusual settings in Chile, where the courts are blasted out of mountain sides, while in Peru, Hood rubber boots and mining pacs are in general use by the miners where water seepage is encountered by the workers. The company manufactures and exports a special short rubber boot worn by the workers in the rice fields of Japan as protection against the many poisonous snakes that infest that region.

In countries like Iceland, Newfoundland and the maritime provinces of Canada, where the major industry is that of fishing, a rubber boot of special scientific compound and constructed to withstand herring and cod oils has been designed by the Hood laboratory force.

Originating a fleece-lined canvas shoe for groups of workers in the Argentine and specially designed footwear to withstand a heat of 135 degrees Fahrenheit during four months of the year in Mesopotamia, the company may be said to run the gamut in its products from the coldest to the warmest countries.

In Venice, the company's rubber soled shoes afford safety and comfort for the gondoliers and tourists on the slippery steps of the ever-present stairways of the city of canals.

The antipathy of the natives of Borneo, and some of the South and Central American countries and the West Indies, to the stiffness of leather, makes these markets of importance to the Hood concern.

At the time Paavo Nurmi, the Flying Finn, came to America he cabled abroad for Hood trackshus, and carried many pairs home when he left America, and General Nobile's party aboard the *Italia* was equipped with Hood lopacs, which were selected by the North Pole Exploration party as being the best obtainable footwear to withstand the extreme conditions encountered in the Arctic icefields.

The company distributes its products through the Hood Rubber Products Company, Inc., which maintain branches in forty principal cities of the United States.

Tennis shoes, gum shoes, gaiters, arctics, lumbermen's shoes, and rubber boots, in the order named, constitute the general product, to which has been added rubber heels, soles and taps, rubber reducers and rubber mittens, pneumatic tires, tubes, and solid tires, radio and automobile battery boxes and jars, all of which indicates that the management has been alive to the possibilities in new industries that have come into being such as the automobile and radio.

A SELF-CONTAINED MODERN ENTERPRISE

Within the past two or three years four substantial structures at the Watertown Arsenal have been leased from the United States Government for shipping and storage purposes, and five or six years ago the Hood Rubber Company acquired the buildings formerly occupied by the Union Carpet Lining Company of Watertown.

Few plants in the country are more self-contained than this manufacturing enterprise. It has 150 trained men in its research, engineering and development departments; it instituted the first industrial rubber chemical laboratory in the United States; it has the second largest automatic dialing industrial telephone system installed in any manufacturing plant in America; it was the first industrial concern in the United States to install the Tele-tape system of automatic telegraph receptions; it main-

tains three plant hospitals, carries six registered physicians, two registered dentists, and a registered optician, as well as nine trained nurses for the service of its employees, and the Watertown plant enjoys the honor of being rated by the United States Public Health Service as having the highest health record of any industrial concern reporting to that bureau; its service department also includes an employment unit, safety and sanitation supervision, a restaurant, library, and recreation room; it maintains one of the largest printing plants in the country; and its mechanical engineers have evolved much new machinery, some of which is manufactured in its own machine shop, and has replaced hand methods by mechanical operations.

BUILDING ON ENDURING PRINCIPLES

From the day the plant opened on November 17, 1896, to the present, certain fixed principles enunciated by its founder have been consistently and rigidly adhered to in every article marketed by him. Frederic C. Hood realized that the only stable foundation upon which to build success was to manufacture quality merchandise and to create and maintain operating conditions that would not only make distributors desirous to handle the merchandise but that would produce happiness and contentment among the employees as well.

To that end he not only revolutionized methods as the corporation expanded, but he introduced, one after another, certain plans which have placed him in the forefront as among the far-seeing industrialists of the nation.

The energy, perseverance, initiative and general activities of the Hood Rubber Company since its inception are due in a great measure to the fact that its development lay in the hands of a young man whose enthusiasm was not to be thwarted. Mr. Hood early recognized the fact that young men must continually be sought out, secured, trained and advised to the end that there may be continuity in policies and that their activities may be developed into a constructive force in building on the experience gained by the older members of the organization.

The rapid growth of the distribution of the company's products has been brought about in part by a change in the methods heretofore found in the general footwear field.

Since 1919 when the Hood Rubber Products Company, Inc., was formed, the Hood organization has supplemented former plans of distribution with its own factory-owned and controlled branches—this in the interest of a more sincere desire to render a quicker and better service to the dealer who handles the products.

The founder has proved beyond dispute that the initiative and experience which will produce a better mousetrap, rubber product, or other commodity, will bring the buyer to New England just as easily as it will take him to the South or to the Middle West. The success of the Hood enterprise is a positive denial of the theory that exists in some quarters to the effect that Massachusetts and New England are disadvantageously placed for successful competition in the American or foreign markets.

The domestic distribution of Hood products is principally accomplished through its subsidiary organization, the Hood Rubber Products Company, Inc., which maintains branches in forty cities throughout the United States.

Stocks of tires and footwear are carried at the branches and other

distributing points from which are filled the orders received from more than 50,000 dealers.

This widespread distribution of stocks puts even the remotest settlement within twenty-four hours of a supply of products and makes possible the filling and shipping of orders upon the same day as they are received.

The corporation has capital of $19,412,480, and when operating normally employs 10,000 operatives. In 1929 The Hood Rubber Company was sold to the B. F. Goodrich Company for $50,000,000, and The Hood Rubber Company, Inc., a new Delaware corporation, was formed, with J. D. Tew as president, Austin B. Mulhall and T. G. Graham, vice presidents, V. I. Montenyohl, treasurer, S. M. Jett, secretary, and Harold C. Haskell, assistant secretary.

THE WEBSTER LUMBER CORPORATION

In 1912 the Webster Lumber Corporation was established on Arsenal Street, and a year and a half later the concern purchased its present location, which includes 350,000 square feet of land, with side track facilities of a little over one thousand feet. Believing that it has the best distribution point for the merchandising of lumber and building materials in Greater Boston, and because of its being so centrally located in the Metropolitan District, the officers have specialized in merchandising within twenty miles of Watertown.

John T. Webster is president, Frank W. Henry, secretary and William A. Webster, Jr., treasurer of the corporation, which has capital of $118,600 and employs seventy-five operatives.

THE BRUNSENE COMPANY

In 1916, H. M. Sawyer & Son, of Cambridge, purchased the Brunsene Company then located in Asbury Park, N. J., and removed it to Watertown in May, 1917, where the manufacture of a complete line of oiled cotton ducks, drills and sheetings, and water repellent and mildew proof fabrics in all weights, constructions, colors, and widths up to 96 inches is carried on. The concern has capital of $100,000, and employs fifty operatives, producing between four and five million yards of waterproof cloth annually. During the past twelve years additions to the plant have quadrupled it in size, and a branch unit is operated in the village of Farley.

C. H. Sawyer is president, George E. Cogswell, secretary, and Howard M. Sawyer, treasurer.

The company maintains sales offices in New York and Chicago.

THE BEMIS ASSOCIATES, INC.

Bemis Associates, Incorporated, was formed in November, 1923, and took over the business of the Bemis Manufacturing Associates, a voluntary association which had been in existence since 1908. The latter organization was formed by Harry U. True, then Boston manager of the Manhattan Rubber Manufacturing Company, and its original product was mending and splicing tissue. Since that time, the company has taken on new lines, manufacturing at its Watertown plant, a true compound,—a base used in the manufacture of chewing gum, and a gutta percha coating for cloth used in the manufacture of shoes. The corporation's officers are: Robert M. Bowen, president and treasurer, and William T. Jarvis, secretary. The concern is capitalized at $145,000.

THE VOSE & SONS PIANO COMPANY

Lewis Vose of Milton was interested in and financially assisted the inventions and enterprises of Benjamin Crehore, of Milton, who made the first American piano, about 1790, and thus the name Vose became identified with that of Crehore, as it did with many pioneer enterprises having their origin in the ancestral Vose house in Milton, where, led by Paul Revere, the American patriots adopted resolutions of independence on September 9, 1775, almost a year in advance of the more famous declaration.

The descendants of Lewis Vose, ambitious not only to build a reputation but also to perpetuate a name, continued their research and capitalized their genius, and, in 1851, James Whiting Vose, a direct descendant of Robert Vose, the 1654 pioneer, and of Lewis and Whiting Vose, both of whom were actively engaged in the business life of Milton, in the latter part of the eighteenth century, manufactured the first Vose square piano, in a modest three story factory, in Boston. He was the son of Whiting Vose, and early showed a tendency to the artistic, being apprenticed to learn expert cabinetmaking, and after acquiring proficiency in the art he began the study of the interior of the piano, devoting his attention primarily to action and keymaking. The first piano he turned out is still in use, and retains its original sweet quality of tone.

For almost eighty years the second and third generations, Willard Atherton Vose and George Atherton Vose, son and grandson of James Whiting Vose, adhered to the high and lofty ideals established by the founder of the concern, and developed and advanced the art of piano production.

Upwards of 100,000 Vose pianos have entered institutions, halls, churches, homes, and the studios of professional people engaged in music, and as early as 1878 the Vose unit began the production of upright instruments, at a time when the trend from the square to the upright piano began.

The new five story Vose factory of concrete and steel construction, erected in 1923, on the Boston Post Road, and opposite the Watertown Arsenal buildings, is the last word in piano-manufacturing equipment.

The Vose & Sons Piano Company produces grand, upright and player pianos, and maintains its Boston warerooms at 158-160 Boylston Street. It has capital of $300,000. George A. Vose is president and treasurer, and D. D. Luxton, vice president.

THE STANDARD FIBRE PRODUCTS COMPANY

The Standard Fibre Products Company was incorporated in 1923, and began manufacturing operations in Somerville, that year, removing to Watertown, in 1924. On May 1, 1929, the corporation's assets were acquired by the National Vulcanized Fibre Company, of Wilmington, Del., and the Watertown plant is now operated as the New England Division of the latter corporation.

C. T. Hansen is general manager of the concern, which produces phenolite laminated bakelite.

THE LEWIS-SHEPARD COMPANY

The Lewis-Shepard Company was incorporated, in April, 1925, and began business at 242 Dover Street, South Boston, as a partnership, ten

years before, removing to 48 Binford Street, in 1917, and occupying the two-story factory, at 561 East First Street, South Boston, two years later.

In 1925 the corporation erected a modern brick and steel one story plant, containing 30,000 square feet, in Watertown, and equipped it with a railroad siding and modern machinery. The next year an addition containing 6,000 square feet was built, followed in 1927-28 by another structure, of 15,000 square feet, so that today the concern occupies upwards of 50,000 square feet of manufacturing space.

Lift trucks were the initial products, being marketed under the name of "Jacklifts." In 1917, steel and wood platforms, for use with lift trucks, were added, and three years later portable elevators, under the trade name of "Stackers" were produced. In 1923, the manufacture of racks for the storage of materials was added, and the concern now builds a complete unit called the "Jack-Stack-Rack" system for horizontal and vertical movement of materials and their storage.

The company also carries on manufacture in Wisconsin, Canada, England and France. The Wisconsin plant takes care of the middle west trade. Offices are maintained in practically all the principal cities of this country. The company maintains an experimental and research department in an endeavor to constantly improve its products and it has successfully met lower price competition from middle west concerns. After two and a half years of research the company developed an all arc-welded steel bound platform, which has met with great favor. In 1928 the corporation purchased the Ames Plow Company Division of the Ames Agricultural Implement Company, and it manufactures at the Watertown plant a division of trucks, barrows and hand carts of various styles.

Its officers are happy in the thought that the Lewis-Shepard Company is regarded as a New England concern, making a New England product of New England quality, and backing it with New England business ethics.

A. L. Lewis is president, W. Lloyd Allen, secretary, and F. J. Shepard, Jr., vice president. The corporation has capital of $135,000 and employs 150 operatives.

THE F. C. HERSEE COMPANY

In 1923, the F. C. Hersee Company was established by F. C. Hersee, who became president and general manager, and by G. O. Monroe, who was chosen treasurer, with M. F. McNeil, sales manager, and a modest amount of space was leased in Brighton. To provide increased facilities that were demanded by steady growth, the first building of the company's present group, was completed, in Watertown, late in 1925, and within two years thereafter an additional story was erected. In 1928 new buildings were constructed, which doubled the original capacity of of the plant, and the present indications are that further expansion will be required in 1929.

The company manufactures automobile tools and electrical connectors for automobile lamps, has capital of $400,000, and employs 150 operatives.

THE SAMSON ELECTRIC COMPANY

The Samson Electric Company of Canton, located the radio and amplifier departments of its business in one of the buildings of the large factory, formerly used by the L. C. Chase Company near Watertown Square, in 1925. The products made there are designed for motion picture theatres, churches, hospitals, veterans' homes, tea rooms, dance halls, dancing

schools, cabarets, clubs, public and private schools, roadside stands, filling stations, concessions, hotels, apartment houses, and industrial plants.

THE HAARTZ-MASON RUBBER MANUFACTURING COMPANY

In August, 1926, the Haartz-Mason Rubber Manufacturing Company was incorporated, with capital of $50,000, which was soon increased to $100,000, and is engaged in the manufacture of rubberized fabrics for automobile tops, raincoat cloths, and hospital and nursery sheetings, together with specialties for the shoe trade and a general line of sundry rubberized fabrics.

The plant comprises two new one-story structures of first-class mill construction, containing a total floor area of about 40,000 square feet, and is well equipped with modern machinery used in the rubberized industry.

The company has enjoyed a phenomenal growth, its production and sales for the first quarter of 1929 amounting to more than four times the volume for the same period in 1927 and was approximately twice that for the four months in 1928.

Sales offices are maintained in New York and Chicago and 125 men and women are carried on the payrolls.

John C. Haartz is president, James G. Grower, vice president and sales manager, Jesse H. Mason, treasurer and general manager, and C. Leo Thebeau, secretary.

THE HAY & PEABODY CEMENT VAULT COMPANY

Messrs. Hay & Peabody started in business, in 1913, in Somerville and manufacture cement burial vaults.

In 1927 the Hay & Peabody Cement Vault Company erected a new factory at 201 Arlington Street, Watertown, which it now occupies.

The officers are: Peter W. Wescott, president, secretary and treasurer; G. L. Davison, vice president, and they, with Eugene L. Bodge, constitute the board of directors. The corporation has capital of $100,000.

THE PEERLESS PRESSED METAL CORPORATION

In February, 1929, the Peerless Pressed Metal Corporation was incorporated, the concern being the outgrowth of the Mahoney & Linstrom Company of Cambridge. Business was commenced by the Peerless unit in Brighton, and in 1928 the present factory was built at 191 Arlington Street, Watertown.

The company produces dies and sheet metal stampings, has capital of $50,000 and employs fifty hands. The officers are Stanley A. Sparrow, of Belmont, president, Peter J. Linstrom, of Medford, vice president and superintendent, and A. L. Mahoney, of Jamaica Plain, treasurer and secretary.

THE ARDEN BOX TOE COMPANY

The Arden Box Toe Company is another shining example of an enterprise whose executives saw the absolute futility of attempting to produce in small volume and sell at prices established by manufacturers of large volume. For two years the corporation struggled along on a policy where the price was the paramount consideration of the management, with quality a secondary matter. Then there came a change in the control of the concern, and the new managers were committed to the New England idea that there exists a definite place in American industry for the conscientious, painstaking quality that has made the names of many Massachusetts

and New England corporations recognized throughout the world. They set out to produce at any cost the best box toe that could be manufactured, and invoked the assistance of science and research, the preliminary results being so encouraging that the factory was virtually turned into a large scale working laboratory, and skilled chemists succeeded foremen, whose only focus had been low-cost production of low quality goods.

The response of the company's factory force was wonderful, the morale being raised to a point that the previous management would have considered impossible. When the employees found they were fabricating something of which they were proud to have had a part in making an entirely new atmosphere was created in the plant, and soon the manufacturers using the Dalo box toe found that despite the fact it cost more than other makes, it proved to be a real economy in the end. The commodity evolved is a highly technical product requiring an intimate knowledge of the six different systems of manufacturing shoes, as well as of chemistry.

Alfred H. Hildreth is president, Stanley P. Lovell, treasurer and Lawrence R. Tibert, assistant treasurer, of the corporation. The marketing of the product is handled for the company by H. E. Locke & Company, Inc., of Roxbury, and the field of distribution covers the United States.

THE WESTON BISCUIT CORPORATION

In 1928, the Weston Biscuit Corporation, of Toronto and Montreal, where it had operated for forty-three years, purchased a plant in Watertown, which cost, with extensions and the installation of machinery, upwards of $500,000, and began the manufacture of a general line of bulk and package goods, embracing some sixteen items. Upwards of 100 persons were employed at the outset, and in 1929 branch warehouses were established in Springfield, in this state, and in Meriden, Conn., to serve the territories adjacent to those cities. According to J. F. O'Brien, president and general manager of the company, the sale of English style biscuits introduced by the concern in New England and New York is rapidly growing. The English style biscuit is radically different from the cookies and crackers that have been made and distributed in this country.

Garfield Weston, the president of the parent company, has brought to this country the baking methods and ovens that are used in England, enabling it to bake and package English style biscuits at a figure quite in line with the price of American style crackers and cookies. The Weston Biscuit Corporation plant in Watertown has been running at capacity for the last several months and a new unit has been opened in New York City to take care of the growing trade in that territory. From all indications it will be necessary in the near future to add plants in other parts of the country. H. S. Conrad is treasurer of the corporation, which employs 500 operatives.

THE WILLIAM UNDERWOOD COMPANY

In that thrilling period of world history, popularly designated as the Napoleonic era, the resourceful Little Corsican is credited with having conceived the possibility of obtaining a portable ration in non-perishable form for his armies, and it is recorded that he offered a prize of 12,000 francs for its production. Traveling far from their bases in their invasion of hostile territory, the French armies found the lands so stripped of forage by the retreating enemy that the problem of feeding the troops was perhaps the most acute of all the difficulties that were encountered.

Ultimately, the Napoleonic award was given to Nicholas Appert, a French scientist, who in 1809 announced the discovery of a process of sterilization by which perishable foods could be kept sweet and fresh for indefinite periods.

Contemporaneous with Appert, was a young man, William Underwood, then living in London, who was serving an apprenticeship in the pickling establishment of Mackey & Company under the eye of masters of the art of blending rare spices with strange fruits and vegetables from many lands.

Whether it was that Underwood was endowed with greater vision than his associates or whether he was guided by the hand of destiny is a matter of conjecture, but the fact remains that he studied Appert's process and apparently saw in it the means of starting out for himself in a new and untried field.

In 1817 William Underwood came to the United States, locating in New Orleans, where he remained but a short time. In 1819 he arrived in Boston and two years later William Underwood & Company was a going concern, and the commercial development of the Appert process of preserving food was under way. His first products were berries and fruits preserved in glass jars.

Like many another pioneer, he met with concerted sales resistance, many people being suspicious of glass jars and their contents, and for a time he found his market in foreign lands and remote localities where preserved foods were welcomed.

ENLARGING THE LINE OF PRODUCTS

By 1828, preserved milk was being shipped by the Boston concern to South America, and this was followed by pie fruits. In 1835, Mr. Underwood imported tomato seeds from England and preserved the product of his first harvest—the beginning of the canned tomato business in this country.

In 1839, Mr. Underwood conceived the idea of using a tin canister as a less expensive and more adaptable form of container. Five years later he established a lobster cannery, at Harpswell, Me., and in 1850 he packed New Brunswick and Prince Edward Island oysters at the Boston plant. It was at this period that he began packing salmon in tin cans, and history records that the first gold that came East from the California mines was concealed in one of Underwood's salmon cans.

Following the death of the founder, in 1864, his son, William J. Underwood, assumed the management of the concern, and later the latter's two sons, Henry O. and William L., became partners. The latter combined the traits of the business executive and the scientist, for it was he who discovered the process of preventing the souring of canned products, and he it was also who exploded the old theory that a vacuum inside the can rather than perfect sterilization at the proper temperature was the all-important essential for the proper preservation of canned goods.

WILLIAM LYMAN UNDERWOOD'S GREAT CONTRIBUTION

The industrial world owes a great debt to William Lyman Underwood, who became nationally known through the results of his research work, carried on jointly with Prof. Samuel C. Prescott, of the Massachusetts Institute of Technology, out of which came the discovery of the reasons for the spoilage of canned goods as then packed and marketed. From his experiments came scientific methods of sterilization now

universally applied and which saved the packing industry of the world from ruinous losses.

Born in Belmont, March 4, 1864, Mr. Underwood left school at an early age to enter the canning business founded by his grandfather.

The injury done to the industry by an unknown microbe caused him to delve into the scientific aspects of the business, and through his research work in that direction he was led to divorce himself from industrial activities, and devote his time and thought to science.

He was the joint author, with Professor Prescott, of the work entitled "Science and Experiment in the Canning Industry."

In 1880 the company built a large, modern plant in West Jonesport, Me., where it began the canning of sardines, and there it continued the treatment of clams, lobsters and other fishery products. Another cannery was established at South West Harbor, on Mount Desert.

A few years later the Boston office was moved from 67 Broad to 143 Richmond Street, where the production of canned goods was carried on, in addition to the operations at the pickling plant, in Charlestown.

On April 1, 1889, the company removed its plant to 44-52 Fulton Street, where all manufacture was concentrated under one roof.

The partnership was dissolved in 1895, and the William Underwood Company was incorporated, with Henry O. Underwood as president and treasurer. William Lyman Underwood remained as a director, but devoted his time to the teaching of scientific subjects at the Massachusetts Institute of Technology. During the first decade following incorporation the sales doubled.

On August 22, 1921, Henry O. Underwood died, and was succeeded as president by his younger brother, Loring, and William J. Underwood, a nephew, was added to the staff. Six years before the corporate form of operation was succeeded by a voluntary association under a declaration of trust.

INTRODUCING DEVILED HAM

Probably the company's most famous internationally-known product is Underwood's Deviled Ham. Just how it came into being is still an enigma among the executives of the company. A likely supposition is that it was concocted from an old Underwood family recipe, the food having become a great favorite among their circle of friends. One fact is proved beyond peradventure, and that is that it was a direct or indirect outgrowth of the Civil War. During the struggle the William Underwood Company was called upon by the United States Government to supply immense quantities of canned meats of various kinds for army rations, and with that experience to build upon it was but natural that William Underwood should have adapted one of his favorite personal dishes to general consumption in times of peace, and he first introduced deviled ham in tins, in 1865.

In 1912, a modern brick factory was built at Bass Harbor, Me., where automatic conveyors, endless belts, and the most up-to-date methods are employed in canning fish products, which are brought to the wharf adjacent to the plant in the company's own boats. The West Jonesport factory, which has now been operated for fifty years, has a daily capacity of 45,000 cans of fish. Here nothing is wasted as the clam shells are used locally for road building. In 1926, the company marketed 11,750,000 cans of sardines, containing not far from 107,000,000 individual fish, and

at both the Maine factories about 30,000 bushels of clams are annually required for the canned products and the company's famous clam chowder.

THE CONCERN LOCATES IN WATERTOWN

Like practically all Massachusetts industries, the William Underwood Company is not content to live in the reflected glory of an honorable past, and in 1927 it first placed on the world market sardines cooked by a new baking process, through the medium of a special apparatus of a type never before employed in a commercial way, and designed and constructed under the supervision of the company's own engineers. Extensive and long-continued experiments with this new process convinced the executives of the concern that baked fish were superior to fried fish in many ways, and this contribution to the canned goods field is a development of great significance to the American sardine industry.

The sales of the company increased to such an extent that it became apparent that the Fulton Street property would soon be inadequate to care for enlarged production, and a large tract of land was purchased in Watertown, where a big, modern plant was erected and occupied in 1928. It is the last word in packing establishments from the standpoint of cleanliness and sanitation, is served by a railroad siding, and there is ample room for future expansion.

Loring Underwood is president and Francis A. Harding, treasurer and secretary, and they, with William L. Underwood, A. L. Ripley, Charles Stetson, and O. G. Wood, constitute the board of directors. The company employs upwards of 400 operatives.

OTHER INDUSTRIES IN WATERTOWN

The Locke-Ray Shine Box Toe Company removed to Watertown, from Franklin, early in 1929, where it carries on the manufacture of box toes for shoes. Formerly known as the Ray Shiner Mills, when located in Franklin, the concern was sold in 1928 by the Norfolk Woolen Company, which owned it, and the new corporate designation was adopted. Walter H. Heaton is the general manager of the corporation.

The Frank Bownes Company, Inc., capitalized for $100,000, employs fifty hands in the manufacture of Red Oval paint products. J. M. Marsh is president, Merle Baker, secretary, and Frank Bownes, treasurer.

C. E. Fahlstrom & Company, owned by C. E. Fahlstrom, produces exhaust fans and employs thirty operatives.

The R. H. Hussey Company, with capital of $60,000, produces chemicals, R. H. Hussey being president, Arthur P. Stone, secretary, and H. D. Foss, treasurer.

The Prime Weatherproof Garment Company of 228 Harrison Avenue, Boston, operates a factory in Watertown, where raincoats are manufactured. The partnership is made up of Israel Settser and Isador Flashman.

The Waterproof Paint & Varnish Company, capitalized for $125,000, employs forty hands in the manufacture of paints and varnishes. Ralph E. Potter is president, Elmer G. Smith, vice president, John J. Meehan, secretary, and John J. Meecham, treasurer.

A fair test is to compare the industrial Watertown of 1875 with the manufactures of 1927.

The Granite State Mica Company, of which George H. Wiswall is president and treasurer, manufactures mica and mica products.

M. S. Kondazian & Son, owned by M. S. and M. M. Kondazian, manufactures men's clothing and employs 300 operatives.

The Odor-Never Company, Inc., with capital of $50,000, has its laboratory for the manufacturing of toilet preparations in Watertown, and its main office at 131 State Stret, Boston. Joseph F. Conant is president, J. D. Upton, secretary, and Arthur R. Morse, treasurer.

The story of the United American Soda Fountain Company, whose plant is in Watertown, is carried in the chapter devoted to the industries of Suffolk County.

A fair test is to compare the industrial Watertown of 1875 with the manufactures of 1927.

In the former year the value of products turned out annually was $1,875,455, and the Aetna Mills, a small paper plant, a bronze factory, the Walker & Pratt Company, the Thomas Dalby Company, and the Metropolitan Shirt Company, constituted the manufacturing concerns of the town.

In 1927, thirty-eight manufacturing concerns produced commodities valued at $51,717,823, used stock and materials valued at $21,122,068, and paid wages amounting to $10,932,166, to 7,631 employees.

The value of Watertown's manufactures that year was more than twice those of the town of Framingham nearly twice those of Malden, and two and a half times larger than those of Waltham.

No town in the county began to approach the Watertown total, which was exceeded only by the figures of Cambridge, Everett, Lowell, and Somerville, of all the eleven cities in Middlesex.

WESTFORD

By 1710 bog iron was being harvested and smelted in Westford, which enterprise gave rise to the name of Forge Village, a cognomen that still survives, for it was in that part of the town that the first crude forge was established. Just before the Civil War use of the product on a large scale was made by various nail factories which came into existence, the Forge Village Horse-Nail Company being formed on January 5, 1865, with $30,000 capital, which was increased to $100,000, three years later when the concern was incorporated. It succeeded to the realty of the Forge Company, and prospered until 1877.

In 1852, Charles G. Sargent began the manufacture of wool-burring and other machines, having invented and patented not only his device for cleaning fibrous materials of dust, burrs, and other matter, but following it by patenting in 1860 a wool-drying machine, an atomizer for oiling wool, and a metallic waste-card for reducing yarn, thread-waste and soft flannels to wool.

The present C. G. Sargent Sons Corporation employs 125 operatives in the production of wool and cotton preparing machinery in its Graniteville plant. A. C. Sargent is president, Charles G. Sargent, secretary, and F. G. Sargent, treasurer, and the concern has capital of $30,000.

THE ABBOT WORSTED COMPANY

For seventy-five years the outstanding industrial enterprise of Westford has been the Abbot Worsted Company.

In 1855, John W. Abbot, as managing partner, and John W. P. Abbot and Charles G. Sargent, as special partners, formed the firm, and twenty hands were employed in the manufacture of fine worsted yarns for braids and upholstery. Two years later, Mr. Sargent retired from the firm, and Allan Cameron became an active partner, under the name of Abbot & Company.

In January, 1858, the plant was burned, and the following year the

concern built a new mill an eighth of a mile below the former location, where carded yarns for carpets were produced.

In 1873, Abiel J. Abbot was admitted as an active partner, and five years later the concern leased a part of the mill formerly occupied by C. G. Sargent & Sons, and built a stone addition to its other plant.

In 1878 the firm purchased the buildings and water rights, at Forge Village, formerly occupied by the Forge Village Horse-Nail Company, and by 1883 200 hands were being carried on the payrolls. The sales at that time amounted to $50,000 per month, and 8,000 pounds of wool were being consumed daily, with a yearly consumption of 2,225,000 pounds.

In 1893 the manufacture of worsted and woolen yarns, fashioned from wool and camel's hair, was commenced, these materials being used in the production of wilton, brussels, tapestry and ingrain carpets.

In November, 1897, occurred the death of John W. Abbot, followed three years later by that of Allan Cameron, and in 1900 the Abbot Worsted Company was incorporated, with A. J. Abbot as treasurer and general manager.

Expansion after expansion followed until it has become the largest carpet yarn producing company in the United States.

In 1912, John C. Abbot became treasurer and general manager, having previously served as assistant treasurer.

The concern was the first in the United States to use camel's hair, and over 1,000,000 pounds are required each year to meet the company's production schedule.

It was the first to use Noble combs in the United States, importing these devices from England.

It combs the Russian Black Sea district, Smyrna, Bagdad, Mossoul, Mesopotamia, China, and South America, for its raw materials.

As early as 1885 the corporation erected community houses at each of its mills, established a library, and has erected 250 dwelling houses in Gorge Village, Graniteville, and Brookside, and its broad industrial relations policy includes the retention of physicians, nurses, dentists, the maintenance of a hospital, the gift of service buttons, the maintenance of a band, and two athletic fields, one at Forge Village and the other at Graniteville, sponsors baseball and soccer football teams, and provides Abbot Hall for entertainments and moving pictures.

The story of its progress has been preserved to posterity through the medium of a film, entitled "The Spirit of Coöperation." With a labor turnover of less than three per cent the answer is found as to why textile employees seek the pleasing units of this up-to-date concern, which has capital of $600,000, and which affords opportunities to 1,100 men and women.

Joshua A. Cameron is president and agent, E. M. Abbot, vice president, John C. Abbot, treasurer and general manager, H. F. Leith, secretary, and they, with D. M. Cameron and G. H. Mumford, constitute the board of directors.

The equipment includes twenty-seven worsted cards, thirty-six worsted combs, two garnets, three pickers, 37,000 worsted spindles, seven boilers and five water wheels.

In 1862 Moore's Woolen Mill was started, making use of a flour plant that was then idle.

One of the quarries of the H. E. Fletcher Company of Chelmsford is located in Westford.

WESTON

A grist mill, established in 1679, a tannery built by Josiah Hobbs, in 1730, and the Hews pottery, founded by Abraham Hews, in 1765, were among the early industries of Weston. The Stony Brook Mills were erected on the site occupied by the original grist mill, and, in 1831, machinery for the manufacture of cotton was installed, the concern continuing to operate until the water privilege was acquired by the city of Cambridge for its water system.

THE HOOK & HASTINGS COMPANY

It is quite the fashion to assume that religion is losing its hold and that interest in public and private worship is declining; yet in a list of Massachusetts firms that have been doing business for more than a hundred years is one whose sole output is applied to enriching public worship and the finer part of home life. Year after year, through ten decades, the business that Elias and George Hook started so modestly in 1827 has gone on building pipe organs, each one a special instrument, especially designed and built to order for a church, a public hall or a home. The tranquil and uninterrupted career of that old Massachusetts concern, the Hook & Hastings Company of Weston sets up a question mark before the skeptic.

In 1827 travel was by stagecoach, on horseback or by canal boat. The Erie Canal had just been completed and opened. The first freight railway had been built to carry the granite for Bunker Hill Monument from the Quincy quarries to tidewater.

The western frontier of civilization was just beyond the Mississippi, and Arkansas, Missouri and Illinois were far western states. Beyond them lay the "Great American Desert," the home of the Indian, the coyote and the buffalo. John Quincy Adams sat in the Presidential chair, and the population of the country was less than twelve millions.

Today, a network of steel connects the Atlantic with the Pacific. The "Great American Desert" is a checker-board of states, and between the eastern and western seas there live and thrive one hundred million more people than there were in the entire country one hundred years ago.

For a century the life of the Hook & Hastings Company has been a part of the industrial history of the country, and has been identified with its artistic and spiritual life. The concern has kept pace with the nation until today, like the ribbons of steel, it reaches every part of the country and provides a common bond between communities widely separated in distance and diverse in their ordinary interests.

The history of the pipe organ in America began about 1713, with the importation from England of what became known as the Brattle organ, and which was the property of Thomas Brattle, who had it set up in King's Chapel. In 1737, John Clemon produced the first American-built pipe organ, and, in 1827, Elias and George G. Hook began producing pipe organs, in Salem, under the firm name of E. & G. G. Hook. In 1832, the firm moved to Boston, remaining in the factory at Leverett and Brighton streets, for twenty-one years, and then removing to a plant in the Roxbury district.

In 1865, Francis H. Hastings entered their employ, and ten years later was admitted as a partner, the firm name being changed to E. & G. G. Hook & Hastings.

In 1885-86 the business was transferred to a modern factory at Kendal

Green, in Weston, and, in 1893, the Hook & Hastings Company was incorporated. In 1891, Norman Jacobson became connected with the concern; six years later, Arthur L. Coburn affiliated with it and, in 1903, Alfred R. Pratt became identified wth it, these three officials having managed its affairs since the death of Mr. Hastings, in 1916.

The first organ built by the Messrs. Hook, in 1827, is still giving service in a private residence, in Brookline. Since that time upwards of 2,500 of the world's finest and largest pipe organs have been built and installed by the company in churches, municipal and memorial halls, theatres, schools and lodge rooms. The concern maintains branches in New York, Philadelphia, and Asheville, N. C. It has capital of $100,000 and employs seventy-five operatives. Arthur L. Coburn is president, Alfred R. Pratt, secretary and Anna C. Hastings, treasurer.

FRANCIS BLAKE—ONE OF THE WORLD'S GREAT INVENTORS

To a Weston inventor, Francis Blake, a native of Needham, where he was born on December 25, 1850, is accorded the honor attaching to one of the greatest inventors of the nineteenth century—the Blake Transmitter, with which every telephone in the world is equipped. In 1873, Mr. Blake became a citizen and realty owner in Weston, and it was here, in a laboratory on his estate, that he employed his leisure time, while still officially connected with the U. S. Coast Survey, in carrying on his investigations in experimental physics.

Within a short time following his resignation from the government service, Mr. Blake's electrical experiments led to what proved to be the most important contribution of the age when he made known to the world, in 1878, the completion and successful operation of the transmitter that bears his name, and which was at once taken over by the Bell Telephone Company. The superiority of this mechanism was immediately acknowledged by scientists and by the tests of opposing litigation, and in a few short months it was established as a permanent feature and requisite of telephone equipment. The transmitter was of such primary consequence that for many years after the original patents were granted there was no substantial change in its parts. Twenty more patents were issued to Mr. Blake in the ten or twelve years following his great basic invention, and to him the electrical switchboard, the Minot-Blake microtome, and many other devices of a far-reaching nature, are credited.

The Massachusetts Broken Stone Company with capital of $100,000, employs seventy-five men in its quarry and crushing plant, at Stony Brook, in Weston, where the finest quality of crushed stone is turned out for highway and other construction. It operates a branch unit, in Greenfield, which serves the western part of the state.

A. J. Wellington is president and treasurer, and C. O. Wellington, secretary.

C. S. Harriman & Company, owned by C. S. Harriman, employs seventy-five operatives, in its tannery at North Wilmington, in the manufacture of patent side and wax split leather.

WINCHESTER

As early as 1640-45 Edward Converse employed water power to drive his corn mill, in Winchester, and on the site of this enterprise other types of manufacture followed, mahogany being sawed in quantities, while veneers were cut in 1843 by Harrison Parker by machinery of his own

invention. When his mill was burned in 1845, it was promptly rebuilt, Amos Whittemore installing therein one of the first machines for pegging shoes.

THE BACON FELT COMPANY

In 1825, Robert Bacon engaged in the manufacture of felt hats, in a plant located on the opposite bank of the river from the site of the present factory of the Bacon Felt Company and before 1850 the production of all-wool felt for the wall paper trade, for polishing marble, and for other mechanical purposes, superseded the making of hats. In the latter year, John H. Bacon, son of the founder, entered the firm, and in 1876 the business was conducted in the name of Charles N. Bacon, son of John H., and it was then that the mill was removed to its present site.

Charles N. Bacon invented and patented a felt wheel, circular in form, and of equal tensile strength in all directions, which proved superior to all other wheels made from sheet felt, or by any other process, and he maintained a sales office in Boston, under the management of his son-in-law, Fred F. Smith. About 1895, Mr. Bacon retired and his sons, Charles F., Louis A., and Robert, continued the business as Bacon Brothers, Louis A. retiring from the firm, a few years later.

In 1903 fire destroyed the main factory buildings, leaving only the boiler room standing, but a new plant was at once erected, and in 1908 the Bacon Felt Company was incorporated, Robert Bacon becoming secretary, and later president and treasurer. The concern is the parent of a lusty child—the Eastern Felt Company of Winchester, which was established by former employees of the Bacon concern.

Felting, wool wadding, and felt polishing wheels constitute the products of the Bacon unit.

Charles F. Bacon is president and treasurer, and Charles N. Bacon is vice president and treasurer.

THE WHITNEY MACHINE COMPANY

One of the first concerns in the United States to engage in the manufacture of leather-making machinery was the Whitney Machine Company, established by Joel Whitney, in 1844. A mechanical engineer and machinist of more than ordinary ability, Mr. Whitney's services were sought after in designing and making new machines for tanners and leather workers and he made most of the machinery used by the early Massachusetts tanners.

Today, the concern employs 125 operatives in producing hide-working machines.

In 1885, Arthur E. Whitney, son of Joel Whitney, purchased the fundamental patents on leather-working machinery and began the manufacture of the Whitney unhairing, hide-working, fleshing and refleshing machines as a specialty, remaining active in the concern until his death, in December, 1917. Today, Robert F. Whitney, grandson of the founder, is president and treasurer of the corporation, and W. C. Goddard, secretary.

The concern, which ranks as a pioneer in the manufacture of roller-type unhairing and fleshing machines, was incorporated in 1917, and there are few, if any, producers of hide-working and beamhouse machinery that have remained in continuous operation for upwards of eighty-five years as has this enterprise.

It has been the policy of the company to devote its attention exclusively to the manufacture of a few machines and to become specialists

in these types, rather than attempt to build a complete line of tanning machinery, and the results obtained seem to prove that the theory was correct, as the company's products are in use wherever hide-working or beamhouse machines are used and are installed in the plants of most of the leading tanners in this country.

"Whitney" Machines are also in very general use throughout Canada, Latin America, Australasia, South Africa, and Europe.

The corporation has capital of $232,000 and employs 150 operatives.

J. H. WINN'S SONS

Whether or not B. A. Goodell and James H. Winn were encouraged in launching their project by engaging in the manufacture of watch hands by officials of the Waltham Watch Company is not definitely determined, but that these two skilled mechanics were employed by that concern prior to the time they engaged in business for themselves is an established fact. Mr. Goodell had been a foreman in the Waltham plant, and Mr. Winn was employed by the Sibley Machine Company of Waltham.

In April, 1868, Goodell equipped a machine shop in his barn in Waltham, and employed Mr. Winn to assist him in the manufacture of watch hands by machinery. Undoubtedly Goodell had been led to attempt the venture because of the experience of an ambitious young man, of limited financial means, probably an employee of the Waltham Watch Company, who decided that the price the concern was paying for hands was so large that their production here ought to bring a splendid profit. He had built in his Waltham home some machines for their production, but reaching the end of his financial rope, he approached Mr. Goodell, who examined the unfinished hands and the machinery produced by the young man, and the apparatus and uncompleted hands were purchased.

Messrs. Goodell and Winn worked evenings in developing the crude machinery to a point where satisfactory production was possible, and finally employed Misses Jennie and Carrie Cummings, sisters of Mrs. Goodell and Mrs. Winn, and employees of the Waltham Watch Company The first products were sold to the local concern and orders were given by the concern for additional supplies.

In September, 1868, a partnership was formed, under the name of Goodell & Winn, the original capital consisting of machinery and tools valued at about $500. Thus was born the first American factory for the manufacturer of watch hands.

Soon the National Watch Company, the E. Howard Watch Company, the New York Watch Company, and the Illinois, Springfield Watch Company were included among the customers of the infant concern.

Before 1868 ended the need of power for their machinery became evident, and water rights in the village of Cummingsville, near Woburn, were purchased, and a water wheel was installed, and operations were transferred there from Waltham, four or five employees assisting the partners. Due to the irregularity of the water supply, removal of the business to Winchester was made about 1870, where a privilege which had been in existence since 1787 was acquired, and where the Richardson grist mill stood. This structure was demolished, and a two-story wooden factory, 20 by 30 feet, was erected. In 1896, Mr. Goodell sold his share in the business to Frank W. Winn, second son of his partner, and the firm name was changed to James H. Winn and Son.

On January 1, 1913, Arthur L. and Harry T., two other sons, became partners, and the name was changed to J. H. Winn & Sons. Upon the

death of James H. Winn that year, the three sons purchased from his estate the interest in the concern formerly held by him and since January 1, 1914, the firm name has been J. H. Winn's Sons.

In 1900 the original Winchester factory was removed to adjoining land and remodeled into a dwelling. A three-story brick factory was erected and gasoline engines were installed for motive power, due to the impurities in the water of the Aberjone River, flowing from waste chemicals deposited therein by the Woburn tanneries. Within recent years electric motors superseded the gasoline engines. In 1910 a two-story wing was added and ten years later another two-story structure was built. The company is now contemplating another addition, in 1930. Until about twenty years ago the raw materials were imported, but the Crucible Steel Company is now providing steel of a quality superior to Swedish steel. Machinery has been simplified, and processes improved.

The radio, television and other triumphs of electricity which have brought with them a demand for a multiplicity of measuring devices, requiring indicator hands, have resulted in broadening the market for the products, and today the General Electric Company is the company's largest customer. The decrease in the orders of watch manufacturers has been more than offset by the needs of manufacturing instruments of all kinds, and indicator hands now outrank watch hands in volume of orders and production. Meter, clock, and watch hands are made at the plant up to eight inches in length.

For more than sixty years when conditions or the nature of the demand changed, the operations of the company were altered accordingly, and machinery and the attendant processes were studied, designed, and perfected within the plant. While much of the success achieved is due to quality product, the Yankee ingenuity displayed by the founders, who saw and seized their opportunities, has been transmitted to the sons of one of the founders.

About ninety operatives are employed at the Winchester plant.

THE INVENTIONS OF GODDU AND LADD

Louis Goddu and Sherman W. Ladd produced at Winchester, in the '70s, various shoe-making machines, including one for attaching the outersoles of boots and shoes by means of a screw-thread wire, a method that was widely adopted by the shoe manufacturers of that period. Ladd later entered the employ of Andrew Eppler, of the Eppler Shoe Machinery Company, as a designer and maker of patterns for a welt sewing machine for boots and shoes. Still later, he collaborated with Charles S. Gooding in perfecting a lasting machine, which, in 1888, was manufactured and marketed by the Hand Method Lasting Machine Company. Between 1890 and 1911 Ladd was granted twenty-six patents on various shoe making machines, the Hand Method concern operating a shop on South Street, Boston, which later was removed to Fort Hill, and from there to Beverly, where the company was reorganized under the name of the Consolidated Hand Method Lasting Machine Company.

BEGGS & COBB, INC.

William Beggs and Elisha W. Cobb formed the firm of Beggs & Cobb, Inc., in 1880, with a combined capital of $4,500, leasing a small shop in Peabody, and at the close of the first year removing to Woburn, where they rented a factory, and, in 1884, built a currying plant, having a capacity of 2,000 sides a day.

In 1889 they began tanning in the John Maxwell factory, at Winchester, and leasing the next year the Alexander Mosely tannery, in that town, then the largest upper leather factory in the United States.

On June 1, 1906, the firm was incorporated with $850,000 capital, and today the concern employs 700 hands in Winchester and Woburn, and controls auxiliary plants in Pennsylvania and Tennessee.

From 1880 to 1909 the concern tanned with bark, but since the latter year only chemical or chrome tannage has been employed. The Winchester plant is the largest tannery of upper leather in the world, and is valued at upwards of $1,000,000.

The foreign trade of the company is very important, representing upwards of a third of the total yearly sales. Today, the concern is capitalized for $2,000,000—a sizable increase over the $4,500 of fifty years ago. Daniel D. Beggs is president, Sydney A. Beggs, vice president, Donald H. Smith, secretary, and Charles O. Howe, treasurer.

THE EASTERN FELT COMPANY

In 1896 Daniel Murphy, Thomas J. Donnelly, Patrick T. Walsh and Patrick Noonan formed a partnership under the name of Eastern Felt & Buffing Wheel Company.

Previous to organizing three of the partners were employed by the Bacon Felt Company, of Winchester, one for twenty-five years and the other two for twelve years each.

In 1904 the concern incorporated under the name of Eastern Felt Company, with the following officers: President, Daniel Murphy; vice president, Patrick Noonan; secretary, Patrick T. Walsh; treasurer, Thomas J. Donnelly. These officers were the sole directors and stockholders, and the officers are the same at the present time.

The sheet felt and felt polishing wheels produced by the concern are of wool and are used by nickel or silver platers and marble workers. The sheet felt products are used by manufacturers of leather, shoes, glass, brass, copper, jewelry and for all mechanical purposes.

The concern is the oldest original firm in this line of business which has not changed the personnel of its membership.

The original capital was $50,000, which was increased in 1922 to $80,000 common and $100,000 preferred.

THE NEW ENGLAND LAUNDRIES, INC.

Many a business man likes to argue that his industry is different from all others, although analysis usually shows that it varies only in non-essentials. One business that is different is that of the modern laundry. As Paul A. Anderson, vice president and general manager of the New England Laundries, Inc., points out, the laundry business differs from most others in that, first, it puts an old household task on a commercial basis; second, it is the most personal of all industries; third, its customers are its chief competitors; fourth, it is expected to take second-hand goods and restore them to first-class condition, and fifth, it has a weekly cycle of production and its representatives must call on its customers two times each week, once for collection and once for delivery.

Hundreds of thousands of articles of all shapes, weights, and sizes; old and new; cheap and expensive; silk, cotton, and wool and combinations of the three, with rayon products thrown in for good measure, pass through the laundry week after week. These hundreds of thousands of pieces, all of which are unfit for use when collected, must be returned to

their owners two or three days after the collection has been made fit in every respect for instant use.

Trace the development of New England's biggest laundry organization and find, if you can, the reason for its development.

When Arthur T. Downer took charge of the little laundry at Winchester, on Friday, August 13, 1898, the chain of laundries now owned and managed by the New England Laundries, Inc., was given its start. At that time he had $500 of his own money and $1,000 which he borrowed. He paid the latter amount for the poorly equipped laundry that two young men had been operating at a loss for several months, and with the remaining $500 he financed the business and supported his family—a task that could scarcely be called hopeful.

The delivery equipment consisted of a democrat wagon, with a basket on the back, and there were but seven employees in the plant.



THE ORIGINAL WINCHESTER LAUNDRY, WINCHESTER

One of Mr. Downer's slogans was: "Use what you have where you are to get what you need." With the old equipment, he set out to do the best work possible, and it was not long before he discovered that improved work could be done with better equipment. But there was no money for new machinery.

The easy way would have been to accept things as they were and utilize the old equipment. But that would have been a violation of his code. The second best will not serve him when it is humanly possible to get the best. That was his way of thinking then; it is his way of thinking now.

No man likes to shoulder a heavy burden of debt, especially one who loves freedom. But Mr. Downer, looking at the growing community in need of a first-class laundry service, saw clearly that his customers would not wait for him if he tried to build on old-fashioned conservatism, and he realized that he would have to take risks, and start on an adventure.

He worked out part of his plan and took into his confidence all who could help him. He laughs now when he thinks of the way he approached the machinery manufacturers.

MR. DOWNER SUCCESSFULLY MEETS A CRISIS

"I have no money at all," he said to them, in effect. "I can't buy your machinery if you insist upon holding to your regular terms. All I can say is that there is an opportunity for some one to build up a fine laundry business in Winchester, and, inasmuch as I am already there, I suppose it is up to me to prove that I am the man for the job."

His enthusiasm was contagious. People instinctively believed in him. He was so earnest, so energetic, so persistent, so confident, that opposition faded away, and he received what he needed. Today he wonders what caused some of the manufacturers to be willing to accept such small payments from him. It was the magic in the man himself that worked the miracle.

As the years went on, his vision grew. Very early he determined to create an organization that would function without all the burden of leadership resting on one man. To make himself unnecessary has been his purpose from the beginning. For that reason he has surrounded himself with men and women who share his vision and who are prepared to carry the business still farther forward.

Here are the figures that show how the business has grown. In 1898, it was started with a net capital of $1,500, and in 1907 it was incorporated, with a capital of $25,000. In 1913 it recapitalized for $125,000, increasing this in 1920 to $500,000 ($200,000 common and $300,000 preferred). The majority of stockholders were customers, evidencing the confidence created by the quality of service that the laundry rendered.

When the new sunlit plant was being built, in 1913, people called it "Downer's folly," and only a comparatively small number of persons, in the laundry business itself, visualized the enterprise as a public-service-rendering institution. Mr. Downer believed that his organization should be housed in a modern building, filled with up-to-date equipment and employing the most progressive methods. The dream of a $500 a week business had been swallowed up years before. The business kept on growing until it passed the $500,000 mark, and nearby communities were making demands which the Winchester plant alone could not satisfy. In 1918, a plant was established in Lowell, and in 1924 a modern unit was erected in Newton, the three divisions being known as the Winchester Laundries, Inc. At this time the corporation was doing business in over forty cities and towns and was operating a fleet of approximately forty-nine trucks.

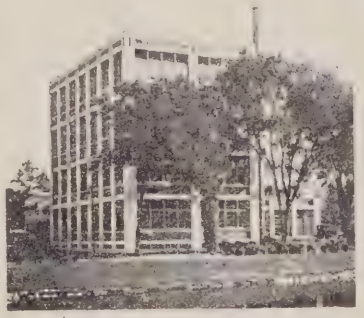
THE CONSOLIDATION OF 1926

In 1926 the officials of the Winchester Laundries, Inc., were invited to manage the consolidated properties of a number of well-known laundries in Massachusetts. This merger was effected, and included Taylor Brothers Laundry and the Highland Laundry of Dorchester, the Quality Laundry, of Somerville, and the Brightwood and City Laundries, of Springfield, and a new corporation—New England Laundries, Inc.—came into being, with capital of $1,000,000 six per cent first mortgage gold bonds; $550,000 seven per cent preferred stock; and 18,000 shares of common stock. The officers are: A. T. Downer, president; F. A. Anderson, treasurer and general manager; R. C. Wallace, sales manager, and H. M. Bell, production manager.

NEW ENGLAND LAUNDRIES INC.



QUALITY PLANT
SOMERVILLE



WINCHESTER PLANT
WINCHESTER



HIGHLAND PLANT
DORCHESTER



CITY LAUNDRY PLANT ~ *SPRINGFIELD*



TAYLOR BROS. PLANT ~ *DORCHESTER*



NEWTON PLANT ~ *NEWTON*



LOWELL PLANT, *LOWELL*



BRIGHTWOOD PLANT ~ *SPRINGFIELD*

From these eight plants a fleet of ninety-six trucks serve approximately 30,000 homes in sixty-two cities and towns of New England.

Certain definite principles of management account for this growth. As General Manager Paul A. Anderson states: "We always assume that the last word has not been said. Our minds are open to new evidence. In no other way can we grow. We also accept as a fact that the sum total of all knowledge is not in any one brain. Ours, then, is a coöperative enterprise. All members of our organization are not only invited but are compelled to contribute. When errors occur, we always ask whether they are avoidable or unavoidable. If they are avoidable, we make the necessary adjustments to prevent their recurring in the future. Another thing we do which is of the utmost importance in this complicated modern civilization is this: We let simple problems remain simple. We always try to accomplish our results in the simplest, easiest, most natural way. To save time, money, and energy is our constant purpose."

Because the officials of the company believe that the last word has not been said and that the sum total of all knowledge is not in one brain, they have played an active part in the laundry trade association movements, such as the Laundry Owners National Association, the chief purpose of which has been the education of laundry owners. Under the auspices of this organization a fellowship was maintained for years at the Mellon Institute, Pittsburgh, for the purpose of studying laundry problems scientifically. Out of that grew the American Institute of Laundering, at Joliet, Ill., where new methods and new machines are tried out in a practical commercial laundry for the benefit of all members of the association. Mr. Downer was one of the founders of the Institute of Laundering and is its vice president.

In addition to associating with their fellow laundry owners and learning from them, the officials of the New England Laundries, Inc., have been members of and have affiliated with organizations whose object is the improvement of business generally, such as the Boston Better Business Bureau, the Boston Chamber of Commerce, the Associated Industries of Massachusetts, the Advertising Club of Boston, the American Management Association, and others, whose executives are constantly searching for ideas. By intimate association with business men in other fields, by working with them on committees, suggestions have come to them that have been adapted to the laundry business. Ideas secured in this way have played an important part in the growth of the New England Laundries, Inc.

It has also been the policy of the officials of the corporation to retain the best technical brains for special work. Management engineers, industrial chemists, and scientific institutions, including the Massachusetts Institute of Technology, have helped materially in the solution of specific problems. Mechanical engineers and cost accountants have also played their part. At no time have the inside men pretended to know it all.

Laundry delivery trucks, for instance, run on a schedule almost as rigid as that of railway passenger trains. Route engineers have worked for twenty-five years studying how to cover the territory with the lowest possible mileage.

There are few concerns in the country with better records. Charts and graphs tell their story. The company has achieved permanent, adequate, and reliable records, which enable its officials to guide it in the direction of growth and success, and as Mr. Anderson states: "We do

not object to a high office cost if it results in increased sales and production."

SOME IMPRESSIVE FIGURES

All this explains why the sales of the old Winchester Laundries increased from $5,000 a year to $750,000, and why the business of the present New England Laundries, Inc., totals over $1,500,000. When Mr. Downer began the business it was worth $1,500; its value in 1926 was $750,000. Of this total, but $210,000 came from preferred stockholders, the remaining $535,000 being money that Mr. Downer put back into the business.

At no time was he interested in "milking the business dry." As a matter of fact, his interest in building up the organization was so intense that he never attempted to draw what an average business man would call an adequate salary. To perfect the organization was his dominating ambition. He saw the organization grow from seven to 225 employees at the time the merger was effected. Today, there are between 550 and 600, while the floor space has increased from 1,920 to 120,000 square feet. Old machinery, which at one time was the best of its kind, has been scrapped ruthlessly and modern apparatus installed. In fact, many manufacturers have tried out experimental machinery in these laundries before putting it on the market, and no effort or expense has been spared at any time by the corporation to find new and better ways of doing things.

The founder of the business is still its chief executive. It has developed in obedience to natural laws, and as growing things turn to the greatest light, so does business turn naturally to the place where it is welcomed and where it is treated hospitably. The officials of the New England Laundries, Inc., believe that a properly conducted laundry, dedicated to the ideal of cleanliness, is an institution worthy of the best it can receive from men and women. Possibly no other enterprise renders a more intimate service, unless it be a restaurant. Its work is highly individualized and intimately personal. In so far as it renders a service, it is fit to take its place with schools and churches, because all useful work is holy work. The highest ideals of service are not too vaulting for a business whose leaders want to grow and serve through the years.

To render a laundry service, therefore, that will free homes from drudgery and liberate women for work which will result in creating greater happiness for themselves and the members of their households is one of the dominating purposes of the New England Laundries, Inc.

THE BAY STATE SAW & TOOL MANUFACTURING CO., INC.

In 1915 the Bay State Saw & Tool Manufacturing Company, Inc., was formed and began the manufacture of "Wizard" hack saw blades and frames, in Roxbury, the equipment being moved to Winchester the following year, where a site was purchased, and a modern plant created. In 1918 an addition was built to care for increased business and E. T. Bailey, of Woburn, its treasurer, became sole owner by the purchase of all the stock of the corporation.

In 1926 fire destroyed the greater part of the plant, but it was at once rebuilt, and operations were continued until 1928, when the assets were sold to the Henry G. Thompson & Son Company of New Haven, Conn., and the equipment was removed to that city, where the concern still operates under its original corporate name, with Mr. Bailey as its president.

THE WILLIAM F. BAIRD COMPANY

While it has been said that happy women, like happy nations, have no history, this assertion does not apply to happy manufacturing enterprises, such as the William F. Baird Company, whose products constitute additional proof of the inventive genius of Massachusetts men.

Prior to 1921 it was the common practice to surround ice cream cans with a mixture of ice and salt in order to keep the product in a frozen state during transit. That year William F. Baird conceived the idea of manufacturing refrigerator truck bodies of the "ice-casing" type, and did away with the difficulties and annoyances of dripping brine and excess weight, as well as maintained temperatures lower than any other system using ice and salt. Cracked ice is placed in hatchways and surrounds the metal refrigerating compartment on the top and four sides, occupying the space between the compartment and the insulated walls of the body. All cold brine is retained to chill the interior, a brass gate valve allowing drainage only when desired. The bodies maintain constant sub-zero temperatures on the hottest days, despite frequent opening of the doors.

A little later the concern introduced bodies refrigerated with frozen brine sealed in metal containers, previously frozen in a cold storage or ice cream handling room, one set being frozen while the other set is in use in the truck. The containers are suspended from hooks and are held motionless by brackets.

In 1926 the Baird mechanically refrigerated body was introduced, power being derived when the motor truck is running, through an electric generator. No auxiliary gasoline engine, or heavy batteries are employed, thus eliminating excess weight, additional machinery, and danger from carbon monoxide fumes when the unit is operating indoors.

In 1928 the company began the manufacture of bodies refrigerated with solid carbon dioxide, which delivers nearly twice as much refrigeration per pound as ordinary ice.

For eight years the concern has constantly carried on original research along lines calculated to improve its refrigerator bodies and has been eminently successful in this work. Patents are pending on several features employed in the mechanically refrigerated bodies and in the company's system of controlling the temperature in bodies refrigerated by solid carbon dioxide.

The company's products are in widespread use all over the United States and in foreign countries as far apart as Denmark and New Zealand.

William F. Baird is the sole owner of the concern, and employs seventy-five operatives, at the Winchester plant, and at the Boston office, 934 Little Building.

OTHER INDUSTRIES IN WINCHESTER

On May 1, 1919, Allen H. McLatchy incorporated the A. H. McLatchy Company with capital of $10,000, and at the outset had plant capacity to turn out 360 sides of patent leather daily. He then employed thirty operatives. The plant has been enlarged until today the capacity is 1,250 sides per day, and eighty-five men are employed. Allen H. McLatchy is president and treasurer, and Arthur F. Ray, is clerk.

The Lamb & Nash Company is engaged in the manufacture of machinery, at its Winchester factory, and maintains a Boston office at 131 State Street.

Henry W. Lamb is president and treasurer and Francis M. Guidrey, secretary.

The Puffer Manufacturing Company, with capital of $408,400, employs 125 operatives in the manufacture of soda fountains, carbonators and marble work. Alvin W. Puffer is president, Leon H. Puffer, vice president, Stanley B. Puffer, secretary, and Luther W. Puffer, Jr., treasurer.

The J. O. Whitten Company employs 100 hands in the manufacture of gelatine. The concern is capitalized for $250,000. George R. Whitten is president, C. A. Perkins, secretary, and Charles O. Whitten, treasurer.

The Winchester Brick Company, of which John J. Gallagher is president and treasurer, and James E. O'Connell, secretary, is engaged in the manufacture of sand lime brick, has capital of $50,000, and employs seventy-five operatives.

In 1929, the Cheney Company began the local manufacture of Cheney interlocking wall flashing.

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